



THE  
SURGICAL CLINICS  
OF  
CHICAGO

*W. J. Farcy*

DECEMBER, 1918

VOLUME 2—NUMBER 6  
WITH 63 ILLUSTRATIONS

INDEX NUMBER

PHILADELPHIA AND LONDON  
W. B. SAUNDERS COMPANY

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PUBLISHED BI-MONTHLY (SIX NUMBERS A YEAR) BY W B SAUNDERS COMPANY WEST WASHINGTON  
SQUARE PHILADELPHIA



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## SURGICAL CLINICS OF CHICAGO

Volume 2

Number 6

CLINIC OF DR. ARTHUR DEAN BEVAN

PRESBYTERIAN HOSPITAL

## ACUTE NECROSIS OF THE THYROID GLAND

*Summary* A patient presenting symptoms of sepsis with signs of acute inflammation in the right side of the neck. *diagnosis*—difficulty of excluding thrombophlebitis of internal jugular. *complete necrosis of right lobe of thyroid disclosed at operation.* *treatment by excision.* *after-history*

September 11, 1918

I SHALL operate this morning on an unusual case of subacute infection of the thyroid gland associated with symptoms very suggestive of a septic thrombus of a large vein.

This patient is sixty years of age. A month ago he was taken acutely ill with chills and fever, the temperature going up to 104° F. and a rather severe sharp pain in the right side of the neck just above the sternoclavicular articulation. This area was also exquisitely tender to pressure. He had frequent recurring chills with high temperature for a number of days and then came to the hospital.

I found on examination a hard wooden like induration just above the sternoclavicular articulation which was exquisitely tender, not fluctuating and seemed to be deeply situated.

We kept the case under observation for several days. He had a few chills with a high temperature. I could not make a diagnosis so explored this area under local anesthesia and found as I cut down on this mass that it was an inflamed thyroid gland embedded in an edematous connective tissue capsule. There was no pus and a cut section of the gland about here showed simply a round cell infiltration. The incision was drained, and I gave him a favorable prognosis stating at the time that it was an exceedingly rare condition, and one that I

had seldom met with, namely, an acute infection of the thyroid gland

Rather to my surprise, and very much to my disappointment, the man did not make a recovery. The severe chills ceased, but his temperature continued. There was very little suppuration from the wound which was kept open and packed with iodoform gauze. In the bottom of the wound one could see a grayish yellow necrotic looking tissue. The whole area remained tender, although the pain disappeared largely from the neck. Then his chills commenced to recur with high temperature, and I was inclined to believe that he had a septic thrombus of some large vein in connection with the first diagnosis of an infection. I have decided to make an extensive exploration this morning under a general anesthetic.

The patient is now etherized, and I shall make an incision parallel with the inner border of the sternocleidomastoid and expose this entire area thoroughly. I divide the skin and superficial fascia and the platysma and come down to the inner border of the sternocleidomastoid which is pulled to the outer side. The sternohyoid and sternothyroid muscles are edematous over this inflammatory mass, and I find that it is necessary to divide them transversely. I now come down to a large yellowish necrotic mass which moves with the trachea and which is clearly the right lobe of the thyroid gland. It is embedded in an inflammatory capsule. The mass itself is very hard, and you see it is difficult for me to find a line of cleavage between this gland and the surrounding structures. By very careful dissection I now expose the upper pole of the thyroid gland and the superior thyroid vessels. I doubly ligate these and divide between. I now expose the lower pole of the gland and ligate the inferior thyroid veins in the same way. With a good deal of difficulty I am now elevating the outer edge of the thyroid, exposing the posterior surface, and taking great care to hug the thyroid tissue in order to avoid injury of the internal jugular vein, which is in very close contact and bound tightly by this inflammatory areolar tissue to the gland, and of course, I am very careful to avoid if possible the recurrent laryngeal nerve.

Continuing the dissection I now ligate the inferior thyroid artery and elevate the gland from the trachea with which it is in very close contact and from which I have to dissect it by very careful dissection with the knife and I then come to the isthmus. I find that there is a very sharp differentiation between the right lobe which is evidently necrotic and the left lobe which is quite normal. There is in fact no distinct isthmus. I simply turn out the necrotic right lobe and leave the normal left lobe. In the dissection I find a hard rigid cord at the outer border of the gland which I am afraid may be the internal jugular vein filled with a thrombus. After further investigation however I think this is not true and that this hard tissue is a mass of areolar tissue with some lymphatic glands. The internal jugular vein seems to be collapsed and does not stand out definitely as in a normal dissection of the neck. I think however that this is due to the fact that it is compressed by the rigid areolar tissue which forms a capsule for the necrotic mass and that it is not due to a thrombosis of the vein itself (Fig 414).

The hemorrhage is now controlled and we shall close this wound only partially leaving about an inch in the center of it packed lightly with iodoform gauze for drainage.

After history — Immediately following the operation the temperature dropped to normal and there has been no recurrence whatever of the chills and high temperature since the removal of the mass showing that the chills and fever were not due to a septic thrombus in a large vein but to the dead thyroid itself.

A microscopic examination showed large areas of necrosis the condition being very much like that of complete infarction. The patient is going on to a rapid and complete recovery.

I have never seen a case of this kind before. The late Dr John B. Murphy in a personal communication told me of a somewhat similar case which he had had in one of the sisters at Mercy Hospital where there was an acute infection of the thyroid followed by a total destruction of the gland and later myxedema. The prognosis in this patient seems good because the left lobe of the thyroid does not seem involved in any way.

I have handled a few cases with acute abscess of the thyroid gland, some of which have been colon bacillus infections, but I have never before seen a case of total necrosis of one of the lobes. I think the case should be reported because of its rarity,

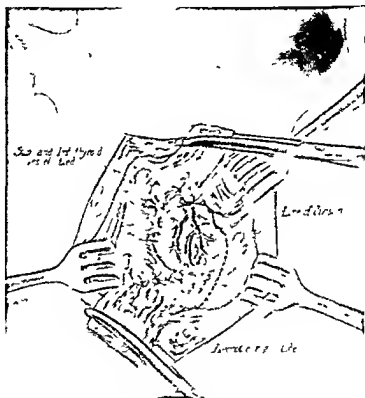


Fig. 414.—Resection of necrotic right lobe

because of the obscurity of the diagnosis and because of the remarkable and complete recovery obtained by a removal of the necrotic mass. It seems to me that from a history of this case the indication in a similar case in the future would be to make an immediate extirpation of the thyroid lobe, provided it

is limited to but one lobe. Where the process involves both lobes, I think the better plan would be to make a very wide exposure of the necrotic mass with drainage, with the hope that in the process of extraction of the necrotic tissue that some of the thyroid tissue might be retained, sufficient to prevent the development of a condition of myxedema.



## SENILE GANGRENE—THE STEPHEN SMITH AMPUTATION AT THE KNEE

*Summary* Site for amputation in cases of senile gangrene, technic of the Stephen Smith operation results

*September 11, 1918*

THE second patient I want to show you this morning is an old gentleman of eighty with senile gangrene. This man has been in the hands of a very competent surgeon for some months. The process developed in the great toe as a black gangrenous area, and remained stationary for some weeks. Finally a line of demarcation formed, and the toe was amputated by simply cutting it off with a pair of bone forceps. The pain, however, persisted and the wound refused to heal and there has been a slow but gradual extension of the gangrene, so that it now involves the two toes next to the great toe and part of the anterior surface of the foot.

When he was first brought to me I opened up the area widely, and found pus extending under the integument for several inches, both on the dorsal and plantar sides. The infected area was widely opened and drained and there has been somewhat of an improvement, but no tendency whatever to repair. The old man is steadily going down hill, suffering great pain, and the problem is, What had best be done with him?

On examining the limb I find that the popliteal artery on that side is pulsating. There is marked atrophy below the knee and I have decided to do what I believe best meets the indications in the case, a Stephen Smith amputation at the knee joint on the ground that if we make a lower amputation we are very apt to find that the anterior and posterior tibials at the division of the popliteal are blocked and that we shall have sloughing in the flap. I have found, too, that no amputation in these cases has been as safe and as satisfactory and has given as painless a stump as a knee-joint amputation. I would not suggest that this be adopted as routine, but certainly in the

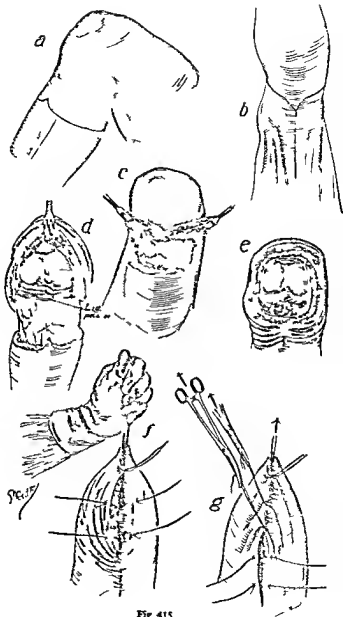


Fig 415.

majority of cases of senile gangrene, where amputation is considered, it had best be done at the knee-joint by the Stephen Smith method.

Many of you who have come into surgery later will not remember Stephen Smith personally, although as an old man of ninety-five he sat on the platform two years ago in New York at the meeting of the American Medical Association, a fine looking, rugged figure, even at that age. Thirty years ago he was one of the most prominent American surgeons. He wrote an exceedingly instructive text-book on operative surgery, one of the best which I have ever read. He devised the operation of a bilateral skin-flap at the knee-joint, which has been known since that time as the "Stephen Smith amputation at the knee." I have employed it in a great many cases, and it is a most satisfactory surgical procedure.

On account of the interference with the blood-supply and the condition of the arteries we shall not employ a constrictor in this case. The patient is now etherized, and I shall proceed with the operation. I begin at a point just below the tubercle of the tibia, to which the ligamentum patellæ is attached, and make a bilateral skin flap (Fig. 415, *a*), consisting of skin and superficial fascia. The incision is carried posteriorly high up in the popliteal space (Fig. 415, *b*). Flexing the knee-joint, and with very little disturbance of the tissues, we are able to reflect these bilateral flaps and expose the ligamentum patellæ. This is divided and the knee-joint opened. As you see, there is but little bleeding from the superficial vessels, and this is controlled by artery forceps. I now divide the ligaments of the knee-joint, and then the extension of the anterior ligaments, extending from the ligamentum patellæ to the internal and external ligaments, and then the internal and external ligaments, and then the crucial ligaments in the joint. I am now

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Fig 415.—The Stephen Smith amputation at the knee. *a*, *b*, Incision; *c*, dissection of hood over knee; *d*, disarticulation at joint; *e*, vessels tied; *f*, hood brought over end of femur and held up with hook. Preliminary sutures; *g*, folds in hood smoothed out for additional stitches by traction on clamped ends of sutures.

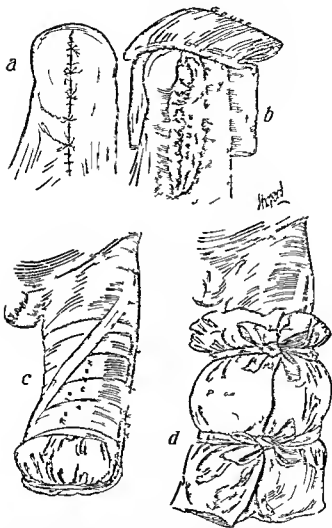


Fig. 416.—The Stephen Smith amputation at the knee *a* Wound closed completely with intermediate interrupted sutures *b* gauze pad placed over closed wound. End of stump covered with gauze fold *c* roller bandage placed and held in place by adhesive tape *d* pillow tied over stump.

able, by flexing the knee still further, to separate the tibia and the femur so that I can readily feel and see the popliteal vessels. These are isolated with forceps. I clamp off the popliteal artery and popliteal vein, both above and below, and divide between. The artery is rather hard. Still it is by no means hopeless, and is in a condition which will probably enable us to secure fair wound healing without great risk of secondary hemorrhage. The internal and external popliteal nerves are now divided high up, and the soleus, gastrocnemius, and plantaris are divided transversely, just on the level of the femur, and the limb removed.

You will see how beautifully these two skin flaps come together and form a cap over the knee-joint, the line of suture forming simply a straight line about 5 inches in length on the posterior surface of the stump. I shall not use any drainage-tube in this case, but will leave about  $\frac{1}{2}$  inch at the upper end of the incision open without suture, so that any blood or synovial fluid may find ready exit. Now I wish you would notice that I am using great care in suturing the line of incision simply with rather fine black silk thread, interrupted sutures without any tension, putting them within  $\frac{1}{4}$  inch of the cut and about  $\frac{1}{2}$  inch apart, and closing the incision entirely. Those who have not tried the Stephen Smith amputation of the knee will be surprised at the beautiful stump that results, and they will be gratified to find the rapid wound repair that usually follows these operations. It makes also an exceedingly useful stump for an artificial limb in spite of the fact that the contrary has been frequently taught.

After-history.—The patient made a splendid recovery from the operation. He had been taking a good many narcotics, and we were able to dispense with these within a few days after the amputation. There is usually a very definite and immediate relief from the pain of semic gangrene secured by this operation, and that was true in this case, the patient going on to a very satisfactory recovery without any gangrene of the flaps and with perfect wound healing.



## UNDESCENDED TESTES

*Summary* Development of the Bevan operation—surgical anatomy of undescended testicle—reasons for operative interference—selection of cases—the proper age—technic—difficult factors and how to control them—division of spermatic vessels necessary in not more than 10 per cent of cases—results

*September 16 1918*

I WANT to show you an operation this morning which we have developed in this clinic and which is at this time of particular interest because of the number of cases that are coming to our notice on account of the mobilization of our man power for war. The operation I refer to is that for replacement of undescended testes. The statistics taken from the military sources of different countries show that about one recruit out of five hundred who comes up for military service suffers from this malformation.

For a great many years no attempt was made to correct the deformity. In 1898 I first looked carefully into this subject because I had brought to me for treatment a boy of about fifteen with double undescended testes. I found that very little work had been done up to that time. Max Schüller in 1881 was the first to handle this condition at all logically. He devised the operation of dividing transversely the peritoneal process that extends from the general peritoneal cavity down to the tunica vaginalis. He found that this peritoneal process was the greatest obstacle to lengthening of the cord sufficiently to bring the testis down into the scrotal cavity. He did this and then stitched the testes in the scrotum. Schüller's plan had the rudiments of a successful operative technic but it was not sufficiently complete to be a successful operation and was not extensively followed.

In studying my first case I was fortunate in having a case in which replacement of the testes into the scrotum was comparatively easy and simple because the testes were both below the external ring easily palpable and somewhat movable and

with fairly long spermatic cords I found that after I had divided the peritoneal processes transversely, as suggested by Schüller, that even in this simple case it was impossible to bring the organs down into the scrotum without tension until I had carefully torn all the shortened fibrous tissue in the cords with dissecting forceps, leaving simply the vas and its vessels and the spermatic vessels, *practically stripping the cord of its fascial coverings*. In this way I found that I could obtain sufficient length to enable me to make the replacement without tension. I then added to the operation several steps

First, the making of a peritoneal sac around the testes and lower part of the cord of the tunica vaginalis by closing it with purse-string sutures. Then instead of stitching the testes into the scrotum after making a large pocket by blunt dissection I dropped the organs back into the scrotum, and closed the neck of the scrotum with fine catgut purse-string sutures leaving just enough space for the cord preventing in that way the organ being drawn back into the inguinal canal. My first operation was a distinct success and very satisfactory in every way, much more so than the results obtained in any of the cases reported in the literature up to that time

I then began a careful study of this whole subject and as my experience increased from one to a dozen or more cases I found that many of the cases were difficult and that the simple technic which I had employed in my first operation would not suffice. It was evident that, in order to obtain a good result it was necessary to place the testes in the scrotum with no tension whatever, and that this proposition was fundamental. In the second place it was fundamental that the blood-supply of the organ should be sufficient to carry on not only its vitality but its function. I soon found that in those cases in which the testes had never been out of the abdominal cavity it was sometimes impossible by the first simple procedure that I had adopted to procure the necessary length of the cord and in studying the subject I found that the shortened portion of the cord was the spermatic vessels, and that the vas and the vessels of the vas were practically in all cases of sufficient length. I began there-

fore, in the intra abdominal cases to divide the spermatic artery and vein and to save the vas and the vessels of the vas, and secure the necessary length in that way. Before doing this however, I satisfied myself by a review of my own varicocele work, and by a review of the experimental work on dogs, to determine the blood supply of the testes, that there were two distinct and separate sources of blood supply for the testicles, namely, the spermatic vessels, and the other vessels accompanying the vas, either of which were quite sufficient to maintain the nutrition and function of the organ. This could be demonstrated by the operations on dogs and was confirmed by the fact that in my own varicocele work for a number of years I had simply saved the vas and the vessels of the vas and removed the spermatic vessels *en bloc* for several inches without any evidence of injury to the organs.

My experience with undescended testes now covers between 400 and 500 operations and is sufficiently large to permit me to give you some pretty definite conclusions about this work. Before going into the technic of the operation, however, I want to discuss the deformity itself somewhat. First of all the condition, of course, may be present either as a unilateral or as a bilateral one. The great majority of the cases are unilateral. Some of them are associated with hernia. Almost all of them have a potential hernia of the congenital type in the sense that there is a continuous cavity from the general peritoneal cavity through the inguinal canal and into the peritoneal pouch external to the external ring. In this connection, I want to make plain one fact that was at first a surprise to me because it was not in keeping with my preconceived idea of the situation. I had been taught that the process of the peritoneum formerly the tunica vaginalis was drawn down by the testis in its descent through the canal into the scrotum. As a matter of fact in the several hundred cases which we have operated upon we have learned that the process of peritoneum extending through the canal into the scrotum or toward the scrotum precedes the descent of the testis. It is a budlet of peritoneum that grows out from the peritoneum just as the arm bud grows out

from the fetus, or just as the vessels grow out into the upper and lower extremities, and it is not dragged down by the organ in its descent, but precedes the descent of the testis itself. This is shown by the fact that in the many cases on which we have operated, and in which the testis has never been out of the peritoneal cavity, we invariably find this process of peritoneum

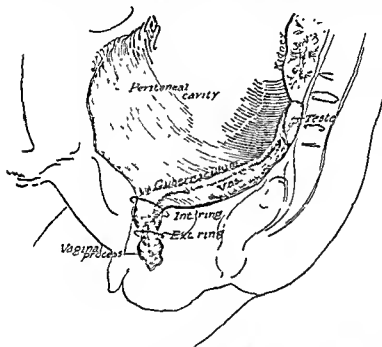


Fig 417—Diagram showing gubernaculum and vaginal process preceding descent of testicle

extending through the canal and well down into the scrotum. Usually this process of peritoneum is of large size, much larger than the normal tunica vaginalis.

There can be no doubt but that the individual is better off with the organs in normal position than if they are in the abdominal cavity or left in the inguinal canal or at the external ring. In the inguinal canal or external ring they are subjected

to trauma much more frequently than when they are in the normal position. This deformity, of course, is invariably associated with great risk of hernia. There is some evidence to show that undescended testes are more apt to be the site of malignant disease than those in normal position. Whether this

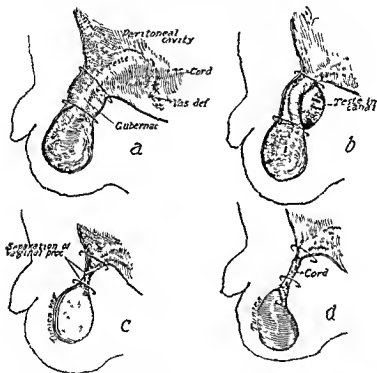


Fig 418—*a* Testicle at inguinal ring *b* Testicle in canal *c* Section showing testicle enfolded by vaginal process *d* Complete descent of testicle with tunica.

is in any way associated with the displacement, or is due more to the imperfect and undeveloped condition of the structures of the organ, is an open question. There is associated with these cases, as in all malformations, a certain psychic element which must be considered. Individuals who are abnormal in any way, and individuals who have this deformity, are apt to be influenced

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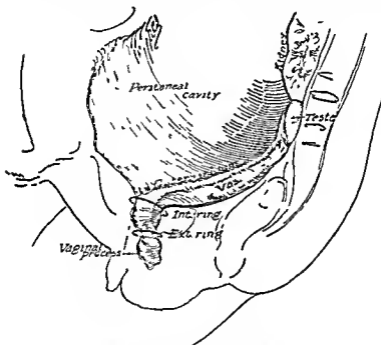


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There can be no doubt but that the individual is better off with the organs in normal position than if they are in the abdominal cavity or left in the inguinal canal or at the external ring. In the inguinal canal or external ring they are subjected

with an undescended testis on one side and with a perfectly and completely closed canal on the other where the testicle is strictly intra abdominal and has never been engaged in the canal has no associated hernia and has never given rise to any discomfort or symptoms of any kind I believe the best plan would be to let that patient alone chiefly because he has one testicle in normal position and one in the abdominal cavity with a completely closed canal The only reason for doing an operation in a case of that kind would be to control the psychic element in the case if it happened to be a matter of great moment in that particular patient If that were the case operation could be very properly considered Wherever the testicle is palpable and there is no distinct contra indication I believe an operation should be undertaken We have had no fatality in the 400 or 500 cases which we have done We have lost three or four testes in this large series either from complete atrophy or necrosis due to a shutting off of the blood supply We have had a dozen or more cases where there has either been a distinct atrophy resulting from the operation or an unsatisfactory result in that there was as a result of the operation simply a small indurated organ high up in the scrotum a condition which is unsatisfactory both to the patient and the surgeon In probably 95 per cent of our cases operation has been very satisfactory and well worth while

The patient upon whom I shall operate this morning has an undescended testis on the right side which is quite palpable at the external ring

The patient is now anesthetized and I shall attempt to describe to you the details of the operation as we proceed The incision made is exactly the same as that which we employ in operations for the radical cure of hernia I am careful not to extend the incision down into the scrotum but keep it well above the scrotal tissue at least an inch I divide the skin and superficial fascia and in the superficial fascia I divide the small arteries and veins branches of the femoral artery and vein that pass up above Poupart's ligament at the lower angle of the incision the superficial external pubic about the middle of the

by it, and especially if it is bilateral. Of course this element varies in different individuals. Sometimes this is a very important factor, and sometimes it is a matter of little moment.

In determining whether or not to do the operation for relief of this deformity we must be influenced by certain factors. First of all it is always desirable to restore conditions to normal if possible. Second, the deformity of undescended testis is frequently associated with a hernia which cannot be comfortably controlled by a truss, but which can be cured at the same time that the operation is undertaken for replacement of the organ. Third, that these patients are much happier and more contented if they can be relieved of the deformity. Fourth, there is less risk from trauma or pathologic processes if the organ is in the normal position than there is if it is left in the abnormal position. Fifth possibly the element of the greater risk of malignant degeneration should be considered, although I think this is not a very important point. Taking all these factors into consideration my experience has led me to the conclusion that inasmuch as the operation for undescended testis can be done as easily and with as little risk as the ordinary operation for the radical cure of a hernia, it should be generally done.

I have frequently been asked what age of selection is there for operation. I have operated at almost all ages. Where however we can choose I should say that somewhere between twelve and fourteen years of age, or the period immediately preceding puberty, should be chosen. If however, an infant of two or three years has an accompanying hernia with the undescended testis that condition calls for operation even at that early age. Of course we have operated upon many adults with greater ease than we have operated on younger individuals and obtained very satisfactory results.

As we have developed our technic I find that we can bring down into the scrotum without any tension practically any testis, even those that have never been in the inguinal canal. I am not now urging operation on all of these cases. Where a man comes to me, for instance, of twenty or twenty five,

peritoneal process surrounding the cord well into view and free the cord well up to the internal ring.

The next step of the operation is to divide the peritoneal process transversely at a point  $\frac{1}{2}$  to  $\frac{3}{4}$  inch below the external ring. This requires a delicate dissection, and we have developed some operative technic that is of value. I first split the vaginal process by a short incision, about  $\frac{1}{2}$  inch in length,

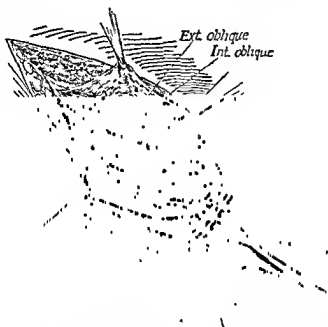


Fig. 420 —External oblique retracted and cremasteric fascia exposed.

parallel with the cord. I then place on this thin peritoneal process four small artery forceps, so as to be able to make the peritoneum tense. If it is difficult to dissect off the peritoneal structures of the cord I not infrequently take a fine hypodermic needle and syringe and inject some normal salt solution under the peritoneum, so as to lift it up from the cord, as you see I do now. This makes the separation of the peritoneal process much easier. The peritoneum is so delicate, being like tissue paper, that

incision the superficial epigastric and sometimes if the incision is prolonged the superficial circumflex iliac is divided (Fig 419)

After dividing the skin and superficial fascia and clamping these small vessels I expose fully the white shining aponeurosis of the external oblique and as I approach the external ring I come to the testis which is surrounded by a large peritoneal



Fig 419—Incl. on o cr canal

sac I very carefully separate this peritoneal sac from the surrounding areolar tissue I now split the external oblique over the canal for a distance of about 2 inches You will see that I am now able to bring the testis out of the incision and place it upon an abdominal pad Making a little tension on the testis and the peritoneal sac surrounding it I bring that part of the

peritoneal process surrounding the cord well into view and free the cord well up to the internal ring

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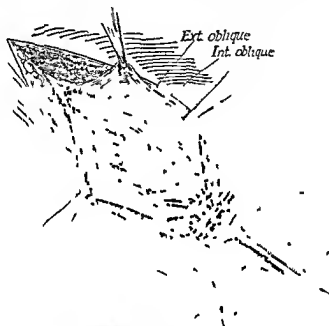


Fig. 420—External oblique retracted and cremasteric fascia exposed.

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now. This makes the separation of the peritoneal process much easier. The peritoneum is so delicate being like tissue paper that

you should make a very delicate and careful dissection. I have now completed the transverse division of the peritoneal process, and ligated the upper end of it that enters into the general per-

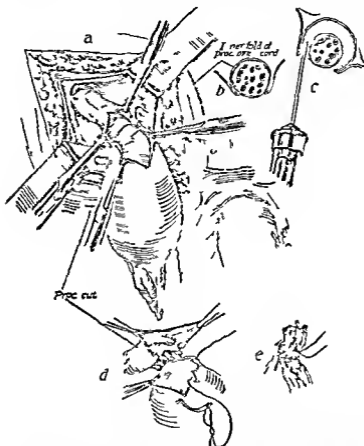


Fig. 421—*a* Vaginal process opened. *b* Section of cord and opened process. *c* Injection of water between process and cord. *d* Vaginal process closed over cord. *e* Proximal end of process transfixed and tied as in a hernia operation.

itoneal cavity with catgut ligatures just as we do the stump of a hernial sac. Picking up the lower portion of the vaginal process with fine dissecting forceps I strip it down from the cord

so as to expose 2 or 3 inches of the cord uncovered by any peritoneum. The lower part of the pouch is used to make a tunica vaginalis for the testis. This is accomplished, either with a purse-string suture or simply a running catgut suture closing the opening. As I lift up the testis and the cord there is still some tension but I find as I examine it carefully that this tension preventing a sufficient elongation of the cord is due to some shortened fibrous bands which I tear across now between



Fig. 422—Schematic representation of vaginal process overlying cord and testicle

dissecting forceps. I regard this as an important step in the operation and it is one that should be thoroughly understood. One can with care divide and tear these shortened fibrous bands leaving simply the vas and its vessels and the spermatic vessels without interfering in any way with the essential structures in the cord. You will see that by this manipulation I have been enabled to free the cord for at least 5 inches a length quite sufficient to place this testis in the scrotum without any tension whatever.



Fig. 423 —Cord freed from adhesions and ready for insertion into scrotum.

With the index finger and a blunt dissection and by packing into it enough gauze I now make a pouch in the scrotum which is quite large enough to receive the testis

without compromising it in any way. The organ is now placed in this pouch, and with a purse-string suture of cat-gut the scrotum is closed, this suture being one that simply goes through the superficial fascia, not involving the skin of



Fig. 424.—Scrotum stretched to receive testicle

course. This prevents the testicle slipping back into the groin, and keeps it well down in the scrotum. The canal is now closed, not as in a Bassini operation, but with the cord deeply situated in the canal, and the transversalis and internal oblique are sewed to the shelf of Poupart's ligament, and the external

oblique is then closed. The skin and superficial fascia are closed in the same way that we would close them in a hernial operation. You will see that the organ is now in the scrotum without any tension whatever, looking very much the same as on the other side.

*This case this morning has been a simple one and not difficult in any way. Some of the cases are more difficult, and it becomes*



*Fig. 425.—Testicle in scrotum and retaining sutures inserted.*

necessary to add a rather radical step to the operation in order to secure sufficient length of the cord. That step is a division of the spermatic vessels, retaining simply the vas and the vessels of the vas. I have been frequently asked how often we are compelled to resort to this procedure. I think I can say that in not more than 10 per cent of the cases. We do not, however, hesitate to resort to it whenever it is necessary to secure suf

sufficient length to place the testis in the scrotum without tension. In these difficult cases we first of all do the technic which I have described to you this morning, the tearing across all the contracted connective-tissue fibers in the cord. If after this has been done it is found that the cord is not long enough, we then examine carefully and see what are the shortened structures



Fig. 426—Closure. Internal oblique sutured to sheaf of Poupart's ligament over cord. External oblique closed with continuous stitch.

Almost invariably the shortened structures are the spermatic vessels. It is necessary to ligate the spermatic vessels in these cases, and we do this by a double ligature, dividing between them, and then unfolding the vas and its vessels gently and carefully until sufficient length is obtained.

We have, as I have already mentioned, lost some of these testes where the vessels have been sacrificed, but the percentage

is small and the prospect of maintaining good circulation and function are sufficiently good to warrant the procedure whenever it is found necessary.

There is a distinct class of cases where the testis is entirely intra abdominal and where the cord is so short that the testis cannot be brought down with sufficient prospect of maintaining a good circulation to warrant the operation and in these cases I believe that the best plan is to leave the testis in the intra abdominal position remove the peritoneal pouch from the canal and that portion of it below the external ring and close the canal tightly as we would do in an inguinal hernia in the female. In our rather extensive experience these cases are rare but they do occur and good surgical judgment would demand that in these exceptional cases where the difficulty of having proper reduction and maintaining a blood supply is so great we should not attempt it.

There is another group of cases of which we have found a few examples in our experience that is the group in which there is found a very rudimentary organ, so small that it is in general not worth while to attempt transplantation some of these being no larger than a pin even in an adult. In these cases the vaginal process and the remnants of the cord structure should be removed as a hernial sac is removed and the canal completely closed to prevent any possible hernia.

On the whole the operation has seemed to me to have been one of the most interesting pieces of surgical anatomy that we find in the whole field of operative surgery. The skilful unraveling of this congenital condition which enables the surgeon to accomplish in a half hour by good operative technic what requires weeks and months in the process of development, with as a rule perfectly satisfactory results has furnished one of the most satisfactory examples of modern surgery.

I would like to emphasize the fact, that the technic must necessarily be difficult to one who undertakes it for the first time especially without having had the opportunity of seeing a number of these operations done by one who has had experience with it. I would also like to emphasize the fact from my

observation of the cases that have been done by some inexperienced surgeons that the operation has not infrequently been undertaken by men who have not fully understood the technic of the procedure, and who have not carried it out in all its details. I would like also to emphasize very strongly the fact that division of the spermatic vessels is but exceptionally called for, and is not at all an essential part of the operation which I have developed that it has in our own hands not been necessary in more than 10 per cent of the cases, and that it should not be done as a routine. On the other hand, wherever it is indicated it should be done and done thoroughly, on the principle that the basic idea of my operation is the necessity of placing the testis in the scrotum without any tension whatever. Care should be taken in the primary dressing of the case not to put on any considerable pressure over the groin, any pressure that might interfere with the circulation in the cord.

Following the operation there is not infrequently a good deal of discoloration of the scrotum on that side. It becomes black and blue and slightly edematous, but unless this is extreme no attention should be paid to it. Occasionally a hematoma has developed in the new scrotal pocket which demanded relief by incision and the introduction of a small collapsible rubber drain or piece of gutta percha tissue, but these cases have formed but a small percentage of the total.

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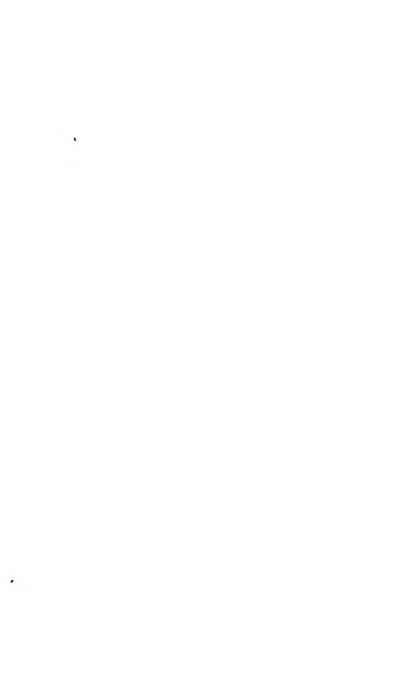
## CHRONIC VICIOUS CYCLE FOLLOWING GASTRO ENTEROSTOMY

*Summary* A patient complaining of loss of weight and stress after meals and the vomiting of food eaten the day before subsequent to gastro-enterostomy for supposed duodenal ulcer discovery of sharp jejunal angulation at operation correction of deformity by anastomosis between proximal and distal jejunal loops postoperative history

THE next patient which I have to show you is one of those complicated abdominal conditions which is made complicated by the uncertainty of the original diagnosis and by the previous operative treatment that the patient has been submitted to

The patient a young woman of about twenty three the wife of an army officer who is now in France has been an invalid for about three years She was a rather nervous girl complaining of more or less stomach distress and was finally operated upon by a very competent surgeon with the diagnosis of duodenal ulcer and a gastro-enterostomy performed The patient had a good deal of abdominal distress before the operation but this has been greatly increased since the gastro-enterostomy She has lost a great deal of weight and is very nervous She has distress after her meals and has frequently vomited sometimes vomiting very large amounts 3 pints or more at a time of food that was taken a good many hours before The case has been analyzed by one of our best medical experts and has been gone over very thoroughly There is no obstruction at the pylorus There is no filling defect in the stomach or in the duodenum There is apparently a marked dilatation of a large loop of bowel as shown by the barium meal in the fluoroscope

The decision arrived at by my medical colleague has been that there is probably an obstruction of a loop of intestine from adhesions She has been under medical management for a great many weeks but has not improved and I have been requested to make an exploratory and determine if possible the



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The decision arrived at by my medical colleague has been that there is probably an obstruction of a loop of intestine from adhesions. She has been under medical management for a great many weeks but has not improved, and I have been requested to make an exploratory, and determine if possible the

cause of the difficulty and remove it if it is found feasible. There have been some attacks which are suggestive of gall-stone attacks in her case, but at the previous operation no evidence of gall bladder disease was found.

The patient is now anesthetized, and we shall proceed to the exploratory operation. I shall make the usual midline incision, between the ensiform and the umbilicus. As I come down to the peritoneal cavity I find there are some rather delicate cobweb adhesions which can be separated without difficulty and which do not bleed. I examine first the gall bladder, and find that it is normal. There is no obstruction to the cystic duct. There are no stones to be felt in the common duct as I place my finger in the foramen of Winslow. The duodenum is normal. There is no obstruction at the pylorus and there is no evidence of any ulcer in the stomach. I now proceed to examine the gastro-enterostomy. I find a mass of adhesions that are fairly readily separated without requiring any dissection or ligature. I want to call your attention as I do this to the fact that there is a sharp angulation in the loop of jejunum which was employed in making the gastro-enterostomy. This angulation seems to me to be unusually sharp and as I allow the stomach and the jejunum to fall into the ordinary place that they occupied in the abdomen the angulation is very marked and evident. As I examine the gastro-enterostomy opening I find that it is quite sufficient admitting my two fingers. Before proceeding further I shall examine the pelvis. I find the pelvis normal and nothing abnormal can be palpated in the general abdominal cavity.

What shall we do with this case? We can separate this loop of jejunum from the stomach and leave her in the same condition that she was before the operation. It seems to me however, that we can adopt a better procedure. I have had the opportunity of analyzing a number of very similar cases and I am inclined to believe that her trouble is due to the sharp angulation at the gastro-enterostomy opening making a condition very much like a vicious circle, with more or less dilatation of the duodenum and proximal portion of the jejunal loop. On

account of this angulation the food passes from the stomach freely through the pylorus into the duodenum distends this part of the intestine and the proximal portion of the jejunal loop and then runs back into the stomach without passing along through the intestine as it should. The indication here it seems to me is clearly to do a lateral anastomosis between the two arms of the jejunal loop so that as the food passes out from the pylorus through the duodenum and into the jejunum it will then pass along into the distal loop of the jejunum without re-entering the stomach. I believe that this is the procedure which should be adopted and I am rather hopeful that it will lead to her recovery.

The operation is done in the usual way as you see by putting a couple of intestinal clamps on these two loops and making an anastomosis about an inch in length by three rows of sutures.

After history.—The after history of this case was extremely gratifying. The patient went on to a good operative recovery although for a few days there was some stomach distress and vomiting. Within a short time however the vomiting and stomach distress ceased the patient's appetite improved and she went on to a perfect and complete recovery. A few days ago I received a very gratifying letter from her saying that she had entirely recovered and was very grateful and very thankful for the operation.

Whether the original operation was necessary or not I can not at this time decide. There may have been good and sufficient reasons for doing the original gastro-enterostomy although without pyloric obstruction or some other definite complication demanding it. I believe that these cases are best handled by proper medical management. There can be no doubt but that surgeons everywhere a few years ago did a great many unnecessary gastro-enterostomies frequently in neurotics and frequently in individuals who had stomach distress from ulcer that might readily be healed by proper management frequently that abdominal distress was the result of gall bladder disease or cholelithiasis and of course not infrequently of the gastric crises of tabes. I believe however that today in

clinics where a large amount of stomach work is done very definite organic evidence is demanded before the gastro-enterostomy is performed. It is possible of course that in this case there was an ulcer of the duodenum which was cured by the gastro-enterostomy, and that it was so small that it left no evidence which I could find at this operation. There is a group of cases however, of which this is an example where a gastro-enterostomy is followed by a condition that might very properly be described as chronic vicious circle which demands either the restoration of the stomach and bowel to the normal condition by undoing the gastro-enterostomy or a lateral anastomosis such as we have done in this case.

## PROSTATIC OBSTRUCTION

*Summary* Patient giving a history of prostatic obstruction of unknown origin, attempt at instrumentation followed by chill, temperature, and complete anuria, suprapubic cystotomy—technic employed, subsequent history, advantages of a cystotomy under local anesthesia in this type of case, advisability of performing a two-stage operation in benign prostatic hypertrophy with obstruction, suprapubic route preferable to perineal in performing prostatectomy

*September 25, 1918*

I WANT to present to you this morning a patient who is in extremely bad condition from prostatic obstruction of as yet unknown pathology. He is eighty years of age, a veteran of the Civil War, and a man who has been in very good general health, considering his age, until the last few years, during which period he has been complaining of frequency of urination with some pus and blood in the urine. His attending physician felt that on account of his age he should be handled medically and without any surgical interference, although he had advised him to consult a specialist and have the bladder cystoscoped to determine the cause of the continued bleeding.

About two weeks ago he had complete retention. A genito-urinary surgeon was called in and found the bladder distended. The man was quite weak in very bad general condition, and semitoxic, and the specialist felt that the best plan would be to simply relieve the retention with a catheter if this were possible. An instrument was apparently introduced into the bladder, but no urine was obtained. Following instrumentation the patient had a severe chill, rise of temperature and apparently a complete anuria for about thirty six hours. He became very toxic and flighty, and it seemed as though he would certainly succumb to the condition. The question of making a suprapubic cystotomy was discussed and at first vetoed because of the very bad condition of the patient. I was then called in consultation, and agreed perfectly with what had been done for the case up to this time, but strongly urged a suprapubic cystot-

omy under local anesthesia for drainage, on the grounds that, although the man was in extremely bad condition, it was absolutely necessary to drain the bladder in order to secure any hope whatever of recovery. The attending physician and specialist both had thought very strongly of the possibility of carcinoma of the prostate or papilloma in the bladder as a cause of the obstruction, and the evidence that existed fully warranted such suspicions.

I have made a rectal examination in this case, and find a very large prostate, which seems from the evidence obtained by rectal examination to be not a carcinoma, but a large benign prostatic hypertrophy. I shall make a suprapubic cystotomy under local anesthesia.

The patient has been prepared, and I now infiltrate the integument and tissues in the median line, just above the symphysis, for a distance of about 3 inches with  $\frac{1}{2}$  of 1 per cent. apothecia with a little adrenalin. I have assured the patient and the family that there will be little distress and little shock from the operation. I now make an incision about 2 inches in length through the integument, superficial fascia and linea alba down on to a greatly distended bladder. On account of the urethral chill and fever that followed the attempt at catheterization before I have made no attempt to pass a catheter into the bladder wash it out, and fill it with boric solution as we usually do in these cases. The abdominal wall you notice is exceedingly thin and the bladder is very greatly distended so that as I now come down to the surface of the bladder it looks like a blue, thin walled ovarian cyst. To make sure of that I introduce a needle on an aspirating syringe and draw off as you see, several drams of cloudy urine. I make a small incision now into the bladder, and you will notice a very free flow of cloudy urine. It is difficult for me to estimate the amount, but I should think that at least 3 pints escaped. You notice that the patient has had no sensation of pain whatever during these steps of the operation.

I take a No. 14 American size soft rubber catheter and introduce it into the bladder for a distance of about  $1\frac{1}{2}$  inches,

and sew it in position with two fine catgut stitches. The small incision through the abdominal wall I sew up with two silkworm-gut stitches and cover the wound with a rather thick, stiff zinc-oxid paste, so as to protect the wound and abdominal wall from the irritating effect of the decomposing urine. You will notice that the urine smells very badly and is very strongly ammoniacal. The patient's condition is so bad that I will not at this time make an effort to explore the bladder and determine the character of the prostatic obstruction.

You can see at a glance that the patient is very toxic. His pulse is running about 44 per minute. His tongue is very dry and covered with a thick brown coat. He is so weak that he can scarcely move.

**After-history and Comments**—The patient improved slowly after the bladder drainage. He had no reaction in the way of chill or increase in temperature. The bladder was washed out twice a day by introducing several times 6 ounces of warm boric solution through a glass funnel just as is employed in giving rectal injections of normal saline solution. I think this is technically a very much better plan than using a syringe or ordinary irrigator. Four or five ounces of boric solution is left in the bladder after the last washing, so as to continue its mildly antiseptic action. Every effort was made by good nursing and careful feeding to improve the general condition of the patient. It was, however, a number of days before we could determine whether or not he would recover from the immediate effects of the intoxication.

Intoxication of this kind, I think, has been very properly described as 'ammoniemia.' I think that it represents a distinct clinical entity, the intoxication due to decomposing foul urine in these distended bladders from prostatic obstruction, especially when it is not associated with any general infection or any temperature. The condition reminds me of the general picture of sapremia, the intoxication that occurs from the absorption of a large infected blood-clot or necrotic mass without the associated picture of invasion of the living tissues.

Gradually the patient's condition improved. His vitality,

however, was so low that there was a sloughing of the edges of the suprapubic wound for a distance of about  $\frac{1}{2}$  inch around the incision. The tube was removed on the third day and the wound simply dressed with zinc oint to protect the abdomen, and the dressings changed frequently, every two or three hours, in order to take up the escaping urine. At the end of about two weeks the patient had improved markedly, so that he could sit up two or three hours a day and could walk about room. The pulse increased to about 80. The operative wound cleaned up completely. I was able to make a digital examination of the interior of the bladder with my finger which showed no carcinoma and no papilloma in the bladder but a large prostate with a large median lobe that hangs over the internal orifice of the urethra like a valve producing quite a complete mechanical obstruction. The patient continues to improve, and we are now confronted with the problem as to how to cure him of his prostatic obstruction, so that we can allow the suprapubic wound to close.

On account of his age and bad general condition I am not inclined to think of any effort at prostatectomy for a number of weeks, until the patient gets so that he can get up and about, and until his general condition improves so that we can undertake a suprapubic prostatectomy with a fair prospect of success. If the patient's general condition does not improve sufficiently to warrant removal of the prostate it will be necessary for us to maintain permanent suprapubic drainage. We can do this with a rubber tube leading into a rubber urinal, which he can wear, or we might use one of the S-shaped silver tubes that Nicholas Senn introduced for the purpose of permanent suprapubic drainage. If this is employed, however it should be removed frequently so as to prevent the formation of calcareous masses about the tube or in the bladder itself.

It frequently requires a good deal of experience and a good deal of judgment to determine whether we should undertake in a case of this kind a radical operation, or whether we should be satisfied with the results that can be secured by suprapubic drainage. The case presents several points that I think should

be carefully studied. I want first to refer to the relative safety of draining one of these bladders by catheter or by suprapubic incision under local anesthesia. I think this point has not been sufficiently clear to most physicians who have had charge of these cases. Given such a clinical picture as is presented by this case, where instrumentation is difficult, I personally feel that a suprapubic under local carries with it very much less risk to the patient than difficult or continued instrumentation. Those who have had wide experience with urethral surgery know what a serious thing urethral fever is. I have personally seen several patients die from the mere introduction of a catheter followed by chill and fever and suppression of urine. This does not occur with suprapubic drainage under local. Under ordinary conditions of course, the use of the catheter is a simpler procedure than suprapubic drainage. In an old septic bladder, where it is difficult to introduce a catheter, suprapubic drainage under local is undoubtedly a safer procedure, and it has the additional advantage that the surgeon can make a digital exploration to determine the exact pathology, and if later a suprapubic prostatectomy is needed this can be done with little difficulty by employing the same incision. That leads me to state that in these cases where we have drained the bladder for prostatic obstruction and where the general condition warrants, within from ten days to three weeks after drainage we can make a suprapubic prostatectomy without the use of any instruments whatever simply dilating first with the little finger the suprapubic fistula and then the index finger, and then with two fingers, and then manually with the gloved finger enucleating the prostate very frequently under gas and oxygen anesthesia if there is a kidney involvement that contraindicates the use of ether. In these cases too, we have simplified the after treatment very much by not stitching in a tube in the bladder after the enucleation but simply dressing the incision with zinc oxid paste and copious gauze dressings changing them sufficiently frequently to pick up the urine.

In connection with these suprapubic operations under local anesthesia, I would like also to call your attention to the fact

that this technic eliminates almost completely the old plan of emptying the bladder with a suprapubic trocar, as the suprapubic cystotomy under local is very much safer than the use of a trocar and very much more satisfactory, because of the oppor-

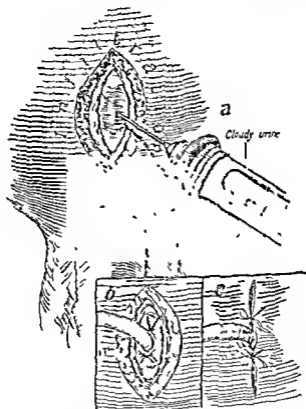


Fig. 427—*a*, Incision over bladder, *b*, bladder empty—catheter sutured in position, *c*, skin closure of wound.

tunity it affords of ascertaining the condition of the interior of the bladder. I would like to advocate this suprapubic operation under local instead of the employment of a permanent catheter introduced through the urethra for drainage, which

apparently is the choice of a number of surgeons in a picture of this kind. I am firmly convinced from my experience that the use of a permanent catheter is ill advised, is dangerous, and should be discarded in almost all cases for the safer technic which I have described.

I should also like, in this connection, to call your attention to the fact that in benign prostatic hypertrophy with obstruction, where there is sufficient sepsis and toxemia to markedly lower the resisting power of the patient, that before prostatectomy is undertaken the patient should be relieved of that sepsis and toxemia by this plan of suprapubic drainage. Certainly, since we have adopted this two stage procedure in our complicated cases our results have been very much more satisfactory, and this plan has reduced very markedly the mortality in a large series of prostatectomies.

I cannot dismiss this case without also impressing upon you what to my mind is always perfectly clear, that the normal and best method of doing prostatectomy is by the suprapubic route. There may be a few proper exceptions to this rule, but anatomically there can be no doubt that the fibro adenomas developing above the line of the ejaculatory ducts, which produce for us the ordinary picture of an enlarged prostate with obstruction, can be removed much safer with less risk of injuring the musculature and blood-supply and nerve-supply that have to do with continence and with less risk of injuring the rectum by the suprapubic route than by the perineal route.

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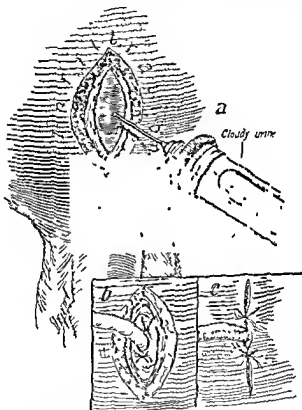


Fig. 427—*a*, Incision over bladder, *b*, bladder empty—catheter sutured in position, *c*, skin closure of wound.

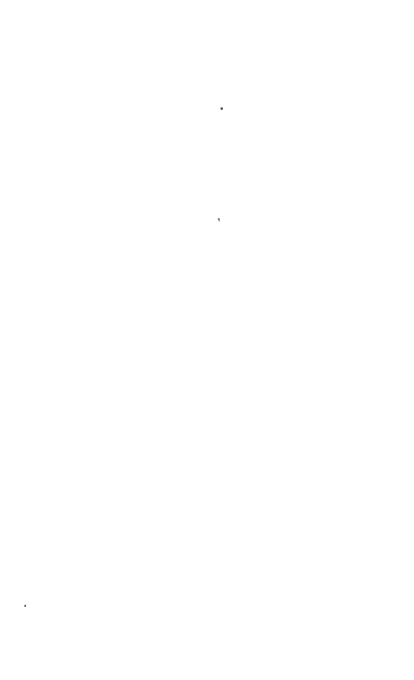
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## RUPTURE OF THE URETHRA

*Summary* Patient giving a history of fracture of the pelvis with rupture of the urethra development of a perineal abscess operation—external urethrotomy by perineal route plastic repair impossible in this type of case—after history importance of correct management of these cases from the beginning

THE second case that I want to present to you this morning is also a urethral case but of a very different origin. This patient is a boy of eighteen who was working on the railroad and was crushed between two freight cars sustaining a fracture of the pelvis with a rupture of the urethra. This was followed by retention of urine. The attending physician attempted with instruments to draw off the water and succeeded several times. It then became very difficult on account of the ruptured urethra to pass the catheter infection occurred and he was compelled to do a suprapubic drainage. Later a large perineal abscess developed and he comes to us now very septic and in an extremely bad condition with a huge abscess in the perineum. The suprapubic wound is now merely a fistula. The indication it seems to me is perfectly clear here that is to do an external urethrotomy evacuating the pus in the perineum and to introduce a good sized rubber tube into the bladder for drainage. The perineal route here is demanded instead of the suprapubic route first in order to provide drainage for the perineal abscess and in the second place so that we can handle the ruptured urethra properly.

The patient is now anesthetized with ether. I make a median incision about 3 inches long in the raphe of the perineum and open at once into this huge stinking abscess. The pus is mopped out and the cavity irrigated with boric solution. I now pass a sound through the urethra down into the perineum but I cannot pass it into the bladder. I cut down on the point of the sound in the urethra. I now take a small grooved director holding the edges of the incision apart and attempt to



find the proximal end of the ruptured urethra. Following the raphé of the urethra, I fortunately introduce the grooved director into the urethra and into the bladder. Along this grooved director I now pass a closed pair of artery forceps. I open the blades and dilate the urethra gently so that I can introduce

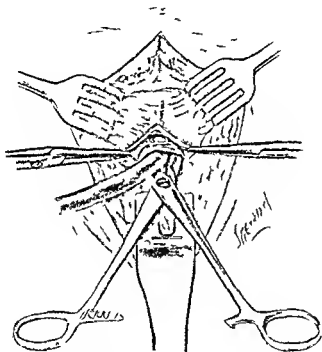


Fig. 479.—Blades of artery clamps opened catheter introduced

my little finger into the bladder. I take a rubber tube about the size of a No. 16 American soft rubber catheter slip it through the urethra into the bladder and stitch it into position with a silkworm gut suture which goes through the edges of the skin and through the rubber catheter preventing its extraction from the bladder. I pack some iodoform gauze lightly around

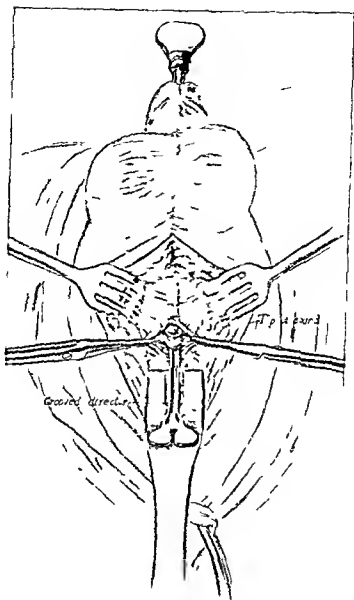


Fig 428 —Grooved director introduced into posterior urethra and bladder

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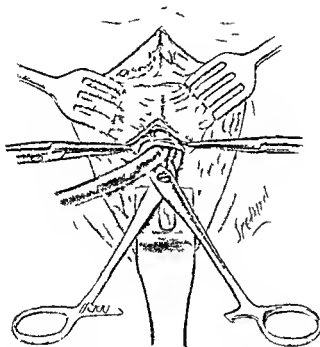


Fig 429 Blades of artery clamps opened catheter introduced

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this tube and in the cavity of the abscess. The two bleeding points, which I pick up with artery forceps, I ligate. The rest of the hemorrhage is of little importance and is controlled by gauze pack.

**After-history and Comments.**—The patient's condition immediately improved after evacuating the abscess. The tem-

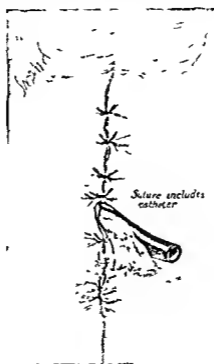


Fig. 4.0—Closure—catheter sutured to edge of skin

perature came down within thirty-six hours to normal. The pain disappeared, and the boy went on to a rapid recovery. In the after management of the case it became of course, necessary to maintain a large caliber of the injured urethra during the process of wound repair so as to avoid a resulting

stricture Within about ten days after the perineal operation the suprapubic wound closed completely The rubber tube in the perineum was removed on the fourth day and on the eighth day under gas anesthesia I very carefully passed some steel sounds through the external urinary meatus and without using any force followed the urethra into the bladder I then passed some larger sounds until I had reached a No 30 French This careful sounding was repeated twice a week until the perineal wound had closed completely We had in this way maintained a good sized caliber through the urethra during the process of wound repair

In cases of this kind it is of course impossible for a surgeon to do any plastic repair of the urethra One must be satisfied with maintaining by sounds a continuous canal through the ruptured urethra and injured soft parts outside of this until wound repair is complete and until this canal becomes lined with mucous membrane which creeps over the granulation tissues of the canal from both the proximal and distal ends of the urethra Of course this is necessarily true in cases of this kind where there has been a very extensive infection with abscess formation My impression is that it is true as a rule in the ordinary case of ruptured urethra where there is no extensive infection and abscess that efforts at plastic repair and accurate suture of the ruptured urethra are of little value

I would like to emphasize the importance of handling these cases of fractured pelvis with ruptured urethra correctly from the start There are of course a few cases in which it is not necessary to do an external urethrotomy where the rupture is not very extensive and where the case can be handled either with a continuous catheter or with intermittent catheterization The rule however is that external urethrotomy is necessary and is much safer for the patient Certainly wherever in cases of this kind it is difficult to pass a catheter and where evidence of infection develops the surgeon should not hesitate to at once proceed to do an external urethrotomy securing in this way free exit of urine and good drainage and securing the necessary permanent result by carefully passing sounds of large caliber dur

this tube and in the cavity of the abscess. The two bleeding points, which I pick up with artery forceps, I ligate. The rest of the hemorrhage is of little importance and is controlled by gauze pack.

**After-history and Comments**—The patient's condition immediately improved after evacuating the abscess. The tem



Fig. 430—Clo-ure—catheter sutured to edge of *Ure.*

perature came down within thirty-six hours to normal. The pain disappeared and the boy went on to a rapid recovery. In the after management of the case it became of course necessary to maintain a large caliber of the injured urethra during the process of wound repair so as to avoid a resulting

## CLINIC OF DR THOMAS J WATKINS

### ST LUKE'S HOSPITAL

#### PERINEORRHAPHY—A SIMPLE AND EFFICIENT OPERATION

*Summary* Principles of operation—technic employed—denudation—hemostasis—closure of wound—reasons for using this method of closure—advantages of approximating fascial surfaces and of burying the sutures

THIS is a short paper upon an operation which is not generally well done. The technical difficulties are few.

**Principles of the Operation**—(1) Repair of the rectocele which is generally present (Fig 431)

(2) Restoration of the posterior vaginal wall for pelvic support

The rectocele is a hernia and should be treated as such. Restoration of the pelvic structures in the posterior vaginal wall consists chiefly in shortening the levator ani muscle and its associated fascias. To mention the other muscles adds confusion without elucidation of the subject.

**Technic**—(1) *Denudation*—This may be done by blunt dissection or by removal of the mucosa in strips. Blunt dissection is preferred in case of very large rectocele. Otherwise denudation in strips is a lvised. The extent of the denudation is shown in illustration (Fig 432). It should extend sufficiently high to enable the purse string sutures to include the upper border of the levator ani muscle and fascia on either side but should not extend so high as to excessively narrow the vaginal canal.

(2) *Hemostasis*—This should be carefully accomplished by fine ligatures and sutures.

(3) *Closure of the Wound*—The hernial opening in the case of a rectocele is closed by one or more circular sutures which unite the levator ani muscle and fascia and the triangular liga-

ing the process of wound repair until we have secured a urethra of such caliber that the resulting scar tissue will not produce stricture. Of course these cases should be looked after carefully and should be told to report to the surgeon once or twice a month for at least a year after the accident, and have the urethra dilated if necessary in order to prevent serious contraction.

in Fig 434 and is for the purpose of insuring complete closure of the upper part of the wound. It is a submucous suture which becomes entirely buried.

(d) The purse string suture is now tied and cut. It completely closes the hernial opening of the rectocele as shown in

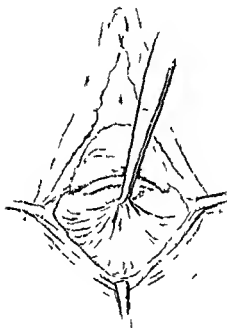


Fig 432 —The triangular ligament is suspended at the median point of its base.  
This suture is not tied until later.

Fig 435. Its knot is also buried when the 'crown stitch' suture is tied as shown in Fig 435.

(e) A second purse string suture is now inserted parallel to the first one but more superficial as shown in Fig 435.

(f) A third purse string suture is now inserted as illustrated in Fig 436. When this is tied there is complete closure of the

ment Figure 432 distinctly illustrates the triangular ligament. This is an exact drawing made during operation. The ligament, however, is broader in this case than usual.

(a) The first suture as shown in Fig. 433 enters at the upper border of the levator ani muscle and fascia and emerges at the upper border of the triangular ligament and is then carried

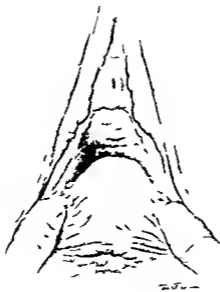


Fig. 431—Rectocele—exact reproduction.

through the base of the triangular ligament for its entire width. It then passes through the muscle and fascia at a corresponding place on the other side. It is not tied at this time.

(b) *Closure of the Sulci on Either Side*—This is accomplished with one or two interrupted sutures in either angle as shown in Fig. 434.

(c) *Emmet's 'Cross stitch' Suture*—This is placed as shown

tying of each successive suture the perineal body is rolled forward and inward. The amount of suture material employed is consistent with the size of the wound closed. Not much suture material is required as the wound is never very large except when stretched.

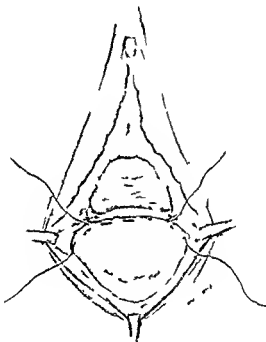


Fig. 434. The circular suture about the rectocele in place but not tied. The sutures in the skin on either side in place, tied and cut. Emmet's crown stitch suture in place and untied.

The rectocele should be thoroughly inverted as the suture is tied, otherwise a knuckle of bowel wall may become included in the suture.

In the case of very large rectocele the inversion may leave too large a dead space. In such a case the size of the rectocele is lessened by using one or two small circular sutures placed

wound, as shown in Fig 437. No sutures are visible, as they are all placed either underneath the skin or mucosa.

**Comments.**—The placing of the first purse-string suture has to be adapted to the individual case as to the amount of tissue included on either side, and as to how far anteriorly the points

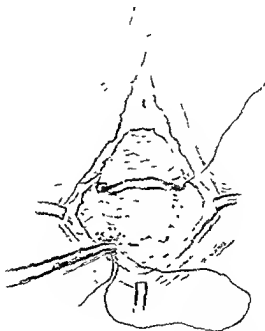


Fig 433 —The first purse-string suture has been carried along the base of the triangular ligament and the needle is emerging upon the right side

of entrance and exit are placed on either side. It should be placed as far anteriorly and passed as deeply as is consistent with its being tied without much tension upon the knot. Its tying quality should be tested, so that it can be replaced if necessary before any additional sutures are inserted.

The oblique placing of the sutures is important as with the

tying of each successive suture the perineal body is rolled forward and inward. The amount of suture material employed is consistent with the size of the wound closed. Not much suture material is required as the wound is never very large except when stretched.

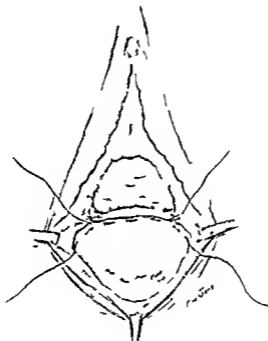


Fig. 434.—The circular suture about the rectocele in place but not tied. The sutures in the sulci on either side in place tied and cut. Emmet's crown stitch suture in place and untied.

The rectocele should be thoroughly inverted as the suture is tied otherwise a knuckle of bowel wall may become included in the suture.

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wound as shown in Fig. 43. No sutures are visible as they are all placed either underneath the skin or mucosa.

Comments —The placing of the first purse string suture has to be adapted to the individual case as to the amount of ulcer included on either side and as to how far anteriorly the points



Fig. 43 —The first purse-string suture has been carried along the base of the triangular lumen and the needle entered upon the right side

of entrance and exit are placed on either side. It should be placed as far anteriorly and placed as deeply as is consistent with its being tied without much tension upon the knot. Its tying quality should be tested so that it can be replaced if necessary before any additional sutures are inserted.

The oblique placing of the suture is important as with the

tying of each successive suture the perineal body is rolled forward and inward. The amount of suture material employed is consistent with the size of the wound closed. Not much suture material is required as the wound is never very large except when stretched.

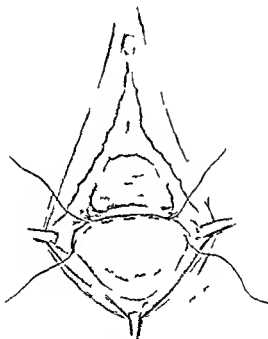


Fig. 434. The circular suture about the rectocele in place but not tied. The sutures in the sulcus on either side in place tied and cut. Emmet's crown stitch suture in place and untied.

The rectocele should be thoroughly inverted as the suture is tied otherwise a knuckle of bowel wall may become included in the suture.

In the case of very large rectocele the inversion may leave too large a dead space. In such a case the size of the rectocele is lessened by using one or two small circular sutures placed

superficially over the rectocele before the first 'purse' suture is inserted

Objection might be made to the displacement of the triangular ligament which results when the first string suture is tied. From observation in a large number of cases I have been unable in a single instance to see obj.



Fig. 435 --The purse-string suture of the rectocele has been tied and cut and has disappeared from view. The crown stitch suture has been tied and cut and its knot appears in the upper surface of the wound.

this. It has not made an abnormally rigid perineum; it has permitted coaptation of firm tissues, and it has helped to restore the perineal body to its normal place, namely, not far from the pubes. The "crown stitch" in exceptional cases should be modified so that it also will be tied without much tension upon the knot. This is accomplished by including less tissue than may

be required, and in exceptional cases it is well to use two of them, one under the mucous membrane of the posterior vaginal wall and a second to approximate the lateral surfaces.

The number of purse string sutures employed should be adapted to the requirements in the individual case.



Fig. 436.—The submucous and subcutaneous suture completes the closure of the wound.

The depth of the sutures in a perineorrhaphy is not as important as the literature would suggest, as the depth of the suture does not necessarily determine the strength of the union. The union is limited to surfaces which are approximated.

The apposition of the fascial surfaces is much preferable to that of apposing muscle surfaces, as the union in either case is one of connective tissue. Suture of the muscle always means

"cutting and atrophy." The suture shown in Fig. 436 can be placed as a circular suture or as the ordinary submucous suture.

The advantages of burying the sutures entirely are diminished dangers of infection and less pain. The operation when

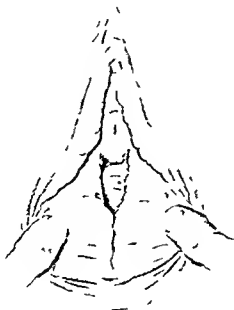


Fig. 437.—The operation is completed and all the sutures are buried.

complete should show an anus and perineum restored to about normal location and palpation to either side of the vaginal canal should show a large amount of tissue in the region of the pubic portion of the levator ani muscle.

## CLINIC OF DR. GEORGE E. SHAMBAUGH

### PRESBYTERIAN HOSPITAL

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## DISCUSSION OF CLINICAL PROBLEMS RELATING TO THE FAUCIAL TONSILS

*Summary* The faucial tonsils and focal infection, the recognition of infected tonsils—types of tonsillitis—chronic infections—indications for removal of tonsils in children—in adults—technic of tonsillectomy—the anesthetic—position of patient—operative methods—control of hemorrhage, complications of tonsillectomy—hemorrhage—subsequent attacks of sore throat, injury to pillars—soft palate and uvula, lung abscess—possible causes, brain abscess and general systemic infection—local trouble in pharynx following tonsillectomy—dryness of the throat—neuralgic pain—changes in the voice.

FAUCIAL tonsils occupy today a much more important position clinically than ever before. In recent years a great many new problems relating to these structures have presented themselves. Foremost among these is the relation of tonsil disease to systemic infection. It has become recognized that a great many serious systemic disorders, such, for example, as rheumatism, nephritis, and cardiovascular diseases, owe their origin very often to disease of the tonsils. With this fact established, the question of the recognition of tonsil infection becomes at once a most important clinical problem, especially the recognition of chronic infection of the tonsil, which in itself causes no local symptoms of which the patient is aware.

Then there is the problem in connection with the indication for tonsil operation. This is by no means the simple question which the advocates of indiscriminate removal of the tonsils would have us believe. The operation itself, its technic and difficulties, as well as the subsequent complications, are all questions of acute interest to the general medical profession. Our views in regard to these problems have undergone very distinct changes in recent years. It is the object of this article

to discuss these problems and the conclusions to which our experience has brought us

**The Faucial Tonsils and Focal Infection.**—The importance which focal infection plays in the causation of systemic disease is becoming more and more apparent. The number of systemic disorders which owe their origin to foci of infection is constantly being added to. A complete list which would include those diseases where the relation to focal infection has been definitely established, as well as those where foci of infection are suspected as an important etiologic factor, include a large number of disorders. Acute and chronic rheumatism, involving the joints as well as the muscles, neuritis, not alone of the peripheral nerves but also of the nerves of special sense, as for example, the optic and the acoustic nerves, acute and chronic nephritis, the cardiovascular diseases, are all included among those where the relation to focal infection is now definitely established. Goiter, appendicitis, gall bladder infection and skin eruptions such as herpes zoster and acne, bronchial asthma and the anemias are all included among those conditions where foci of infection are often suspected as being the most important etiologic factor. The part which the faucial tonsils play as the focus for systemic infection is a very important one. On the other hand, the recognition of a condition which is known to be caused, as a rule, by focal infection does not in itself incriminate the tonsils. Other foci such as infection about the teeth, the nasal accessory sinuses, and of the genito-urinary tract, often act the same way as does infection of the faucial tonsils. The tonsils apparently play a much more important part in causing systemic infection than do these other foci, excepting perhaps the teeth. It is quite easy to see why this is so. In the first place, the tonsils are so frequently the seat of acute streptococcus infection that we are prepared to see systemic infection as a frequent occurrence from this source. The structure of the tonsils is moreover, admirably suited to retain infection once they become involved. Deep crypts extend from the surface through the substance of the tonsil to its capsule. Very often the tonsil is so hidden in the soft palate, or covered over by a fold of mucous

membrane from the anterior pillar, as to close the openings of the crypts and facilitate the retention of secretion and infection in these pockets

**The Recognition of Infected Tonsils**—Recognizing the important part which tonsil infection takes in causing systemic disease, the detection of infected tonsils becomes a very important question. We do not accept the proposition that because the tonsils so often cause systemic infection, therefore all tonsils should be considered a menace and should be removed. This would lead to a great deal of unnecessary operating.

Tonsils which are the seat of attacks of acute tonsillitis are much less frequently overlooked than are the cases of chronic tonsillitis. The acute process produces, as a rule, such characteristic symptoms that it is readily recognized even in young children. Nevertheless acute infection of the tonsils occurs in adults as well as in children which passes unrecognized as such by the patient or the parent. In children it is not uncommon for the associated gastro intestinal symptoms to so overshadow any evidence of throat trouble as to obscure the fact that the patient is suffering from acute tonsillitis. Even when the child is old enough to complain of sore throat, there is often no mention of this condition, and it is only by examining the fauces that the tonsil infection will be detected.

A similar condition is not infrequently observed in adults. The patient will deny ever having attacks of acute tonsillitis, but will often admit having frequent attacks of acute sore throat. An examination during one of these attacks will disclose distinct evidence of tonsillitis. As a rule, patients recognize acute tonsillitis as such only when the tonsils are much swollen or the seat of white patches—acute follicular tonsillitis. As a matter of fact, the milder forms of acute tonsil infection are quite common, and it is our experience that such cases are about as prone to have systemic complications as are the cases of more violent reaction. Where a patient denies having attacks of acute tonsillitis but admits suffering from recurring acute sore throat, it is well to ask the patient's return during one of these attacks, when a careful examination of the fauces

to discuss these problems and the conclusions to which our experience has brought us

**The Faucial Tonsils and Focal Infection.**—The importance which focal infection plays in the causation of systemic disease is becoming more and more apparent. The number of systemic disorders which owe their origin to foci of infection is constantly being added to. A complete list which would include those diseases where the relation to focal infection has been definitely established as well as those where foci of infection are suspected as an important etiologic factor include a large number of disorders. Acute and chronic rheumatism involving the joints as well as the muscles neuritis not alone of the peripheral nerves but also of the nerves of special sense as for example the optic and the acoustic nerves acute and chronic nephritis the cardiovascular diseases are all included among those where the relation to focal infection is now definitely established. Goster appendicitis gall bladder infection and skin eruptions such as herpes zoster and some bronchial asthma and the anemias are all included among those conditions where foci of infection are often suspected as being the most important etiologic factor. The part which the faucial tonsils play as the focus for systemic infection is a very important one. On the other hand the recognition of a condition which is known to be caused as a rule by focal infection does not in itself incriminate the tonsils. Other foci such as infection about the teeth the nasal accessory sinuses and of the genito-urinary tract often act the same way as does infection of the faucial tonsils. The tonsils apparently play a much more important part in causing systemic infection than do these other foci excepting perhaps the teeth. It is quite easy to see why this is so. In the first place the tonsils are so frequently the seat of acute streptococcus infection that we are prepared to see systemic infection as a frequent occurrence from this source. The structure of the tonsils is moreover admirably suited to retain infection once they become involved. Deep crypts extend from the surface through the substance of the tonsil to its capsule. Very often the tonsil is so hidden in the soft palate or covered over by a fold of mucous

hook (Fig 438) is the best way of discovering the size of such tonsils. The retention of cheesy secretions in the pockets of the tonsils is by no means so common in children as in adults and as a rule they are found only in tonsils that are enlarged and especially in the cases where the tonsils are embedded in the soft palate. The presence of these cheesy masses may often be surmised by the detection of a bad odor on the breath.

Chronic infection in adults is frequently observed in tonsils that show no evidence of enlargement but are decidedly shrunken. The evidence of infection in such cases is detected in several

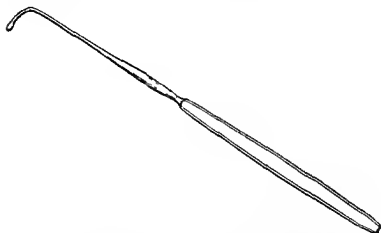


Fig 438 — Blunt tonsil hook for exploration of the tonsillar region

ways. In the first place the surface of the tonsil as well as the adjacent anterior pillar may be the seat of a well marked congestion which is more significant when it appears in contrast with the normal mucous membrane in the rest of the pharynx. When the congestion over the tonsil is but a part of a general congestion extending over the remainder of the pharynx we do not accept this appearance as an indication of infection in the tonsil. The latter condition is not infrequently caused by excessive smoking or overindulgence in alcohol.

One of the most striking evidences of chronic infection is

will disclose distinct evidence of tonsillar infection. On the other hand, it should be remembered that sore throat is by no means synonymous with tonsil infection. A circumscribed or diffuse pharyngitis occurs not infrequently when the tonsils do not appear to be involved.

The recognition of chronic infection of the faucial tonsils is often a much more difficult matter. Where the tonsils are much enlarged, as is sometimes the case, the presence of chronic tonsillitis can be readily detected. It should be borne in mind, however, that the presence of enlarged tonsils is by no means synonymous with infected tonsils. In children especially one frequently sees tonsils that are distinctly enlarged projecting into the pharynx, where there has never been an attack of acute tonsillitis, and where no local evidence of tonsil inflammation can be discovered. Such tonsils we do not class as cases of chronic infection, nor do we recommend their removal, especially when, as is often the case, they are found superficially located and not embedded between the folds of the soft palate. Of course when the enlargement is sufficient to cause obstruction in breathing we advise their removal, just as we do adenoid enlargement which causes similar symptoms of obstruction. Enlarged tonsils in adults are more frequently infected tonsils since the simple hypertrophy more frequently seen in childhood usually undergoes retrograde changes before adult life. We do, however, occasionally observe tonsils in adults that show a distinct enlargement but where a careful examination fails to discover any positive evidence of chronic infection and where there is no history suggesting attacks of acute tonsillitis.

In children chronic infection of the tonsils is usually associated with enlarged tonsils and in most of the cases there is a distinct history of recurring acute inflammation. Examination between the acute attacks discloses tonsils that are not alone enlarged but are the seat of very marked congestion. When the tonsils are embedded in the soft palate they may be very much enlarged and yet escape detection by a superficial examination. By causing the patient to gag and at the same time exploring the surface of the soft palate with a blunt tonsil

tion to a greater or less extent. Where the presence of these concretions is not especially marked and particularly where it is not associated with other evidence of infection such as enlargement and congestion we are not inclined to consider their presence a serious menace. When the cheesy masses are large they usually produce an offensive odor of the breath which in itself will at times justify the removal of the tonsils.

Aside from the annoyance caused by these cheesy concretions chronic tonsillitis itself does not produce local symptoms by which the patient could detect the condition. Not infrequently however the chronic trouble is associated with attacks of acute inflammation which produces a sore throat of which the patient is quite aware. Tonsils that are the seat of recurring attacks of acute inflammation we would class as chronically infected tonsils even though between the acute attacks the evidence of chronic infection may not be at all distinct. It is not uncommon to discover evidence of chronic infection when there has never been an attack of acute tonsillitis or sore throat that the patient can recall. Since tonsils which are so frequently the seat of acute inflammation as to justify the conclusion that they are the seat of a focus of chronic infection frequently disclose between attacks no positive evidence of such infection and since chronic infection is often discovered where there has been no history of acute sore throat the question naturally arises whether tonsils may not be the seat of a chronic infection even where there has been no history of acute tonsillitis and where an examination fails to discover any evidence of a chronic infection. We have found that just such a combination may occur. We have removed tonsils because of a serious systemic infection where there had been no history of sore throat and where the examination disclosed no superficial evidence of tonsil infection and have opened into an abscess in the course of operation. This has occurred several times in our experience. It is our opinion that this combination is not at all common. As a rule where tonsils play a part in causing systemic infection there will be a history of attacks of acute tonsillitis or an examination will disclose unmistakable evidence of chronic infec-

disclosed by the expression of pus from the tonsil. This is done by using a blunt tonsil hook and exerting pressure along the periphery of the tonsil over the soft palate. A tonsil from which pus can be expressed in this way as a rule shows other evidence of infection especially the congestion described above. Expression of pus from the tonsil is not such a frequent phenomenon as some would have us believe. Pressure over the base of the tonsil very often expresses a semiliquid caseous deposit from the follicles which has a whitish appearance and is often mistaken for pus. Actual pus-pockets may be found in any part of the tonsil. More frequently this is discovered at the upper pole but the same condition is also found at the extreme lower pole or around the middle of the exposed surface of the tonsil. In this connection it should be mentioned that larger or smaller pockets of pus are occasionally uncovered during an operation on the tonsil the presence of which had not been suspected by the most careful examination before the operation. Still another condition of chronic tonsillitis is not infrequently discovered in examining the tonsils. Shining through the surface in patches varying in size from a pinhead to a centimeter across will be seen a yellowish fluid which cannot be expressed by pressure over the tonsil. There may be one or several such pockets in the tonsil. They represent follicles the mouths of which have become closed. When slit open the contents are found to be a thick grumous pus. It is our experience that this condition is much less a menace than the one just described where pus is expressed by pressure over the tonsil. The pus in the sealed pocket is often free from virulent organisms.

Another evidence of chronic infection of the tonsils is the presence of cheesy concretions in the follicles. As mentioned above this condition may be found in children especially where the tonsils are enlarged and embedded in the soft palate. The condition is much more common in adults and is found in the small shrunken tonsil as well as in the tonsil that is enlarged. It is not infrequently associated with other evidences of infection such as a distinct congestion over and about the tonsil. It is our experience that a majority of adults have this condi-

this condition evidence of chronic infection or a history of attacks of acute tonsillitis. In all such cases the tonsils should be removed. The whole question of the indications for removal of the tonsils in children may be summed up briefly as follows. All cases where the tonsils are large enough to interfere with normal nasal respiration, cases where there is a history of recurring attacks of acute tonsillitis, cases where a serious systemic infection has complicated an attack of acute tonsillitis, cases where the tonsils are chronically infected, as shown especially by their enlargement, the presence of cheesy concretions and congestion about the tonsils, and, finally, where there is a well marked cervical adenitis.

In adults the indications for tonsillectomy are somewhat different. The chief indication is the presence of a systemic infection, yet the removal of tonsils in adults is by no means restricted to such cases. An adult who is suffering from recurring attacks of tonsillitis should have the tonsils removed just as we advised for children. The danger from the operation and the resulting discomfort do not compare with that caused by an attack of acute tonsillitis. When the acute tonsil infection has been complicated by a peritonsillar abscess the need for having the tonsils removed is all the more urgent, especially as this is such a painful affection, and because the danger of serious complications is greater than in simple acute tonsil infection. A single attack of acute tonsillitis, if followed by a systemic infection such as rheumatism, endocarditis, or Bright's disease, is an adequate indication for tonsillectomy, undertaken as a prophylactic measure against subsequent attacks which are prone to cause a recurrence of the systemic trouble.

When an examination of the tonsils discloses marked evidence of chronic infection we advise their removal even though the patient may have had no local discomfort from attacks of acute infection, and though there is as yet no distinct indication of a systemic infection. The evidence of chronic infection which justifies the removal of the tonsils under such circumstances is as follows:

- (1) When on making an examination one is able to express

tion In the majority of cases both of these conditions will be present. The only cases where, in the absence of recurring acute tonsillitis or local evidence of chronic infection, the removal of the tonsils is justified are those cases where the patient is suffering from a serious systemic infection and where a thoroughgoing examination by an experienced internist fails to discover any other likely focus.

**Indications for Removal of the Tonsils**—It is not many years since the operation for removal of the faucial tonsils was limited practically to children. Adult life was usually considered a contraindication to tonsillectomy. In children the indication for operation was chiefly an enlargement, especially where the tonsils projected free in the pharynx, and were not embedded in the soft palate. Since we have recognized that tonsil disease, acute as well as chronic, is frequently the cause of serious systemic infection the indications for their removal have been very much widened. In children we still advise removal of enlarged tonsils especially where the enlargement is sufficient to interfere more or less with proper respiration. Such a condition is, as a rule, associated with an enlargement of the pharyngeal tonsil (adenoids). The majority of the cases where today we recommend the removal of tonsils in children are cases where the size of the tonsil is not the determining factor. A child which is subject to recurring attacks of tonsillitis is, we believe, better off with tonsils removed. A child which has suffered from a serious systemic infection such, for example as an endocarditis or acute Bright's, as the result of an acute tonsillitis attack, should we believe have the tonsils removed even though they are not enlarged and though there has been only this one attack of tonsillitis. On the other hand a single attack of acute tonsillitis where there has been no systemic complication and where the tonsils have not been left enlarged with evidence of a chronic infection does not, in our opinion constitute an adequate indication for tonsillectomy. Enlargement of the cervical lymphatics in children, as a rule, is the result of a persistent tonsil infection, and where this adenitis is at all marked it is unusual when there is not associated with

temic infection even in the absence of an acute reaction in the tonsils

(2) Cases where the systemic trouble develops as a complication of acute tonsillitis

(3) Cases where there is a history of one or more attacks of peritonsillar infection. Such tonsils are especially prone to be the carriers of a persistent focus of infection

(4) When an examination discloses evidences of a chronic tonsil infection, expression of pus from the tonsils, enlargement and congestion over and about the tonsils, or cheesy concretions in the tonsil crypts

(5) Cases where there has been no history of attacks of acute tonsillitis, and where examination fails to disclose any distinct evidence of chronic infection, are operated only when the patient is suffering from a serious systemic disorder and when no other likely focus is discovered

When we have followed these indications, we believe all the cases which will be improved by tonsillectomy will be cared for, and that we will be reducing to a minimum those cases where the removal of the tonsil will be followed by no distinct benefit

It hardly seems necessary in this connection to emphasize the fact that the physician should always be guarded in the prognosis in these cases of systemic infection. We cannot safely promise any of these cases that the removal of the tonsils will cure their trouble. What we should make clear to the patients is that the trouble from which they are suffering is frequently the result of tonsil infection and that they have the type of tonsil which we know does frequently cause this trouble, and, furthermore, that it often clears up after the removal of the tonsils. We should make it clear that we have no definite way of knowing whether in their case the tonsils are responsible for the trouble, or whether, even if the disorder has been originally due to disease of the tonsil, their removal is going to cure them. The patient should always understand fully the situation before we undertake the operation

pus from the tonsils. As pointed out above the presence of pus in the tonsil should not be confused with the expression of a few drops of milky fluid which represent semiliquefied cheesy concretions from the tonsil crypts. The latter is much more frequently encountered than is the presence of pus and has often been confused with an actual pus infection.

(2) When the tonsils are found enlarged and the seat of persistent congestion that is not simply a part of a diffuse congestion involving the mucous membranes of the pharynx.

(3) When the accumulation of the concretions in the tonsil crypts is very marked and especially when these concretions are causing an offensive odor to the breath.

The most common condition requiring the removal of tonsils in adults is the presence of a systemic infection which owes its origin to some primary focus. In such cases the possibility of other foci than the tonsils must be kept in mind. This fact, together with the correct diagnosis of the systemic trouble makes it extremely desirable that the throat specialist should not assume control of such cases. These cases should be handled in co-operation with a competent internist who is better able to determine when the disorder is due to a focal infection and whether the evidence supplied by the specialist warrants the conclusion that the tonsils are the probable etiologic factor and whether they should be removed. It is our belief that the decision to operate in such cases should rest rather with the internist who is better able to see all sides of the question. By handling the cases in this way we believe that the unnecessary operations on the tonsils can be reduced to the minimum.

The evidences of tonsil infection which justify their removal in cases where the patient is suffering from a systemic infection of focal origin we would summarize as follows.

(1) When there is a history of recurring attacks of acute tonsillitis even though there may be no recent attacks and where the systemic trouble has developed apparently independent of an attack of acute tonsillitis. Recurring attacks of acute tonsil infection mean as a rule that the tonsils are the carriers of a persistent focus of infection which we believe may cause sys-

the back, as it prevents the inhalation of blood and obviates the necessity of using a suction apparatus to keep the pharynx free from blood. Such devices only add one more obstacle in the field of operation. To administer a general anesthesia with the patient sitting upright is, in our opinion, against the best teachings for administering anesthesia. The only advantage that can be claimed for the upright position is that it assists the operator who is accustomed to operating in this position. As a matter of fact it is just as easy for the operator to work on the tonsils with the patient lying on the side.

The operation is not begun until the pharyngeal reflexes have been pretty well abolished. The method of choice in operating is not the same in all cases. When the tonsils are enlarged, and especially where they project rather freely into the pharynx, the method suggested by Sluder of pressing the tonsil through the ring of the tonsillotome or snare is to be preferred. We do not find, however, that this is the method of choice in all cases. Where the tonsils are small and especially where the anterior pillar is short and rigid, the operation can be done with less traumatism by seizing the tonsil with a suitable tenaculum, lifting it out of its bed, and with a straight scalpel incising the attachment around the upper pole, freeing the anterior and posterior pillars. The lower tonsil is always loosened first, so that the bleeding will not interfere with the operation. When both have been prepared in this way for the snare, the lower tonsil is then drawn through the loop of the snare and the tonsil slowly cut off. The assistant then presses a gauze sponge firmly into the empty fossa and the anesthetist reapplies the ether cone for a few moments, while the operator is preparing the snare for the remaining tonsil. This tonsil is then removed in the same way and pressure applied with a gauze sponge to the tonsil fossa. The operation in children is never concluded without examining for adenoids and their removal when present. We prefer the La Force adenotome, followed by the Hartman curet, and then with the finger to make sure that Rosenmüller's fossæ have been carefully cleaned out. With a large gauze-sponge pressure is then made against the soft palate,

## TONSIL OPERATION

The complete removal of the tonsils by enucleation has been practised only in very recent years. Formerly the amputation of the tonsil by means of a tonsillotome was carried out when an operation on the tonsil seemed advisable. The chief reason why the enucleation was resorted to was that so frequently after the operation of tonsillotomy infection persisted in the smaller or larger stub that remained after this operation and because not infrequently the patient was found to have even more trouble from this source than before the operation.

In children the operation is always done under general anesthesia. It is not at all immaterial what anesthetic is employed. Serious results from the operation have been due more often to the anesthetic than to any other factor. The anesthesia may often be begun to advantage with nitrous oxid and oxygen especially with nervous children. It is rarely necessary to have a struggle with the child if the anesthetic is administered tactfully by an expert accustomed to handling children. Gas anesthesia has sometimes been employed throughout the operation but it is not so suitable for the careful successful removal of the tonsil as is ether.

Too often stubs of tonsils escape detection because of the haste with which the operation has to be performed which will require a subsequent operation. The danger from inhalation of blood and infected material from the tonsil is greater with the gas anesthesia especially since the upright position is often employed while under the anesthesia. When the operation is called for in children under two years as is rarely the case it is best to dispense with the preliminary gas as this is a more dangerous anesthetic in young children than straight ether.

We attach a great deal of importance to the position of the patient during operation. We place the patient lying on the side with the left arm drawn under the knees flexed so as to make the position of the patient more stable on the operating table. The operator sits on a low chair beside the table while the tongue depressor is held by an assistant. This position is much better than the more usual one with the patient lying on

operation the bleeding is more easily checked, and the danger of a complication from the operation is less than when a general anesthetic is used. All in all the discomfort which the patient suffers during and after the operation is very much less when local anesthesia is employed. The anesthesia is obtained by rubbing a small pledget of cotton saturated in a 5 per cent solution of cocaine made up in adrenalin, 1 : 1000, around the attachment of the tonsil. The application should be continued until the surface of both tonsils is thoroughly deadened. This is then followed by the injection of novocain solution, 1 : 200, along the posterior pillar just beneath the mucous membrane

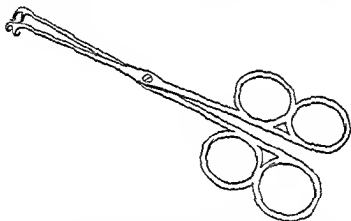


Fig. 439.—Forceps used in hitting tonsil out of its fossa.

A deep injection is then made into the lower pole of the tonsil. By pressure with a curved needle over the soft palate the location of the base of the tonsil is determined and injections are made by forcing the needle through the anterior surface of the soft palate into the capsule at one or more points. Difficulty is not infrequently encountered in having these deep injections retained as the fluid is prone to escape through the tonsil crypts when the point of the needle fails to enter the capsule. This is especially true when they have become adherent through peritonsillar infection. A complete anesthesia cannot be obtained when the deep injections have not been successfully carried out.

forcing it up into the postnasal space. This tends to check the bleeding and to prevent the blood from this region from getting into the lower pharynx. Should it be discovered that there is still bleeding from any point in the tonsil fossa the bleeding point is seized with a curved artery forceps and held for a few minutes. We have not found any necessity for ligation of vessels where this method has been employed.

The operation in adults is quite a different affair. Until quite recently the operation for removal of tonsils was contraindicated in adult life. It is only since we have appreciated the full importance of the tonsil as a focus for systemic infection that we have learned that the tonsils can be safely removed in adults. Formerly when the tonsils were the seat of disturbing local symptoms recurring attacks of acute infection, or gave annoyance because of cheesy concretions in the crypts various methods were resorted to for giving relief. Among these the slitting of the tonsil crypts and the reduction of the tonsil by means of the electrocautery were the methods chiefly employed. These methods have now been replaced by the operation of tonsillectomy for the reason that the older methods often failed to eliminate the foci of infection. Indeed it was found that the partial removal of the tonsil by the operation of tonsillotomy or the use of the cautery often left a condition more troublesome than before. It appears that the scarring over of the surface of the tonsil without removing the foci of infection in the depths of the crypts provided a condition from which systemic infection was more likely to result than where the tonsils had not been disturbed. The operation of slitting the pockets for the relief of the annoyance from cheesy accumulations is still employed but it is our opinion that when the tonsils are suspected of causing systemic infection their complete enucleation should be resorted to except where this operation seems too dangerous because of high blood pressure.

The technic of the operation for enucleation of the tonsils in adults is quite different from that employed with children. The safest and best way is to do the operation under local anesthesia. The patient rarely experiences any pain during the

pletely checked. We aim to keep the patient on the operating floor for about ten minutes after the operation. When this precaution is employed it is extremely rare for us to be annoyed by subsequent bleeding. The cases which formerly gave us trouble were, as a rule, cases where a slight oozing was allowed to go unchecked at the time of operation. This we have found usually came from an artery which opened up and bled more freely after the patient recovered from the immediate shock.

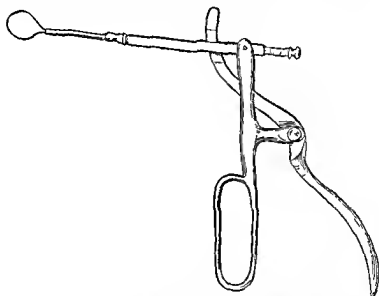


Fig. 441.—Type of tonsil snare best adapted for complete enucleation

of the operation. After both tonsils have been removed, one should examine carefully the region of the lower pole. An elongation of the tonsil in this region often exists which is not brought into the snare. This fragment if not removed may subsequently enlarge giving the impression that the tonsil has recurred. In other cases this fragment remains a focus causing systemic infection.

**Complications**—Under this heading I wish to discuss first, situations which may arise during operation causing unusual

Both tonsils are first loosened before either is removed. This is done by seizing the tonsil by suitable forceps (Fig 439) and lifting it out of its fossa. An incision is then made with a long handled sharp scalpel (Fig 440) along the line of attachment of the mucous membrane over the upper pole, and along both anterior and posterior pillars. When this has been accomplished for both sides, one tonsil is pulled into a tonsil snare (Fig 441), employing a stiff No. 8 piano wire. The cutting off of the tonsil by the snare may be carried out slowly, so as to aid in checking the bleeding. As soon as the tonsil is removed the fossa is hastily inspected for spurting arteries. When

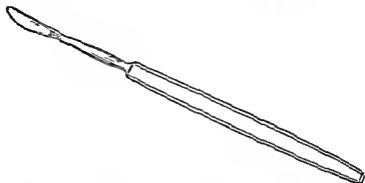


Fig. 440.—Long handled sharp scalpel for dissection of tonsil.

these are located each point is seized by a curved artery forceps and held for a few moments. As a rule there are but one or two such spurting arteries. The largest one is usually found about the junction of the middle with the lower third of the tonsil fossa. Another point is sometimes found near the upper pole and another at the lower pole. The forceps can be removed after a few moments and the enucleation of the second tonsil accomplished in the same way. When the bleeding keeps up because of difficulty in finding the bleeding point the bleeding can often be checked immediately by having the patient gargle with ice-cold water. The patient should not be taken to his room until we are quite sure that the bleeding has been com-

pletely checked. We aim to keep the patient on the operating floor for about ten minutes after the operation. When this precaution is employed it is extremely rare for us to be annoyed by subsequent bleeding. The cases which formerly gave us trouble were, as a rule, cases where a slight oozing was allowed to go unchecked at the time of operation. This we have found usually came from an artery which opened up and bled more freely after the patient recovered from the immediate shock.

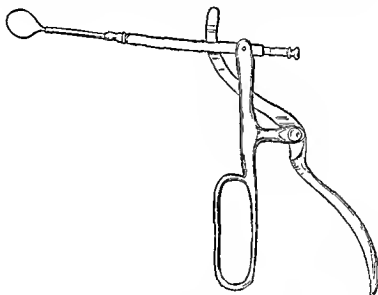


Fig. 441.—Type of tonsil snare best adapted for complete enucleation.

of the operation. After both tonsils have been removed, one should examine carefully the region of the lower pole. An elongation of the tonsil in this region often exists which is not brought into the snare. This fragment if not removed may subsequently enlarge, giving the impression that the tonsil has recurred. In other cases this fragment remains a focus causing systemic infection.

**Complications**—Under this heading I wish to discuss, first, situations which may arise during operation causing unusual

difficulties, and, second, conditions which occur as a result of the operation.

As regards the operation itself, this is by no means the simple procedure which some would have us believe. This is particularly true in those cases where the need for the operation is the greatest. In cases where the tonsils are not adherent, and where there are no general conditions to make the operation difficult, the procedure is often simple enough, especially when performed by one who has become dextrous in the technic. On the other hand, where the tonsils have become adherent as the result of recurring attacks of peritonsillar inflammation, and especially if they are at the same time enlarged tonsils, the operation in any one's hands may be a difficult one. It is our belief that the operation is as much of an undertaking for the patient as is the operation for removal of the appendix. Quite often, too, the operation is called for in patients very much weakened because of a serious systemic infection such as an endocarditis, or in the case of gonorrhea. Here the difficulty of the procedure is very much increased because of the general condition. In all the cases where in adults either local or general conditions complicate the operation the local anesthesia is preferable. In cases where the tonsils have become adherent because of peritonsillar inflammation the difficulty of the operation is due to two factors—first, the difficulty of securing a satisfactory anesthesia, and, second, the fact that the tonsil cannot be lifted from its bed and drawn into the snare for enucleation. As regards the anesthesia, in spite of every care, we have often found it impossible in these cases to secure anything approaching a complete anesthesia. In spite of this fact, however, we prefer to operate these cases under the local anesthesia. The same is true of the serious systemic conditions referred to above. The increased danger to the patient when the general anesthesia is employed makes us choose the local anesthesia.

It is important that the tonsils be carefully dissected from the pillars, particularly from the posterior pillar. When the latter is injured during the operation the result is usually more

serious than when the anterior pillar is injured. The resulting contraction in either case pulls the soft palate over toward the injured side. When the injury has been to the posterior pillar, the lateral band of the pharynx on that side is prone to become infiltrated, subjecting the patient to the symptoms of chronic pharyngitis. Not infrequently the thickened lymphatic tissue in the region becomes the seat of attacks of acute inflammation with the symptoms which are characteristic of acute tonsillitis.

It happens occasionally that the uvula is engaged in the snare when the tonsil is being removed. This accident is likely to be more or less serious, as the uvula is not only amputated close to its attachment, but the free edge of the soft palate on that side is almost sure to be denuded of mucous membrane. The resulting contraction is often surprisingly great, and it is in these cases particularly that the function of the soft palate is often sufficiently interfered with to produce a permanent defect in the speech.

It sometimes happens that after the tonsils have been enucleated the uvula becomes very much swollen and edematous, and when this was already relaxed and elongated before the operation the subsequent edema may be the source of great discomfort to the patient. We have had several cases of this sort where, on the second or third day after the operation, we have resorted to amputation of the swollen uvula, to the great relief of the patient. After several experiences of this sort we found it desirable to amputate the uvula at the time of the tonsil operation in those cases where before the operation it was found very much elongated. It is advisable not to take off more than half or at most two thirds of the uvula, for the subsequent contraction of the scars from the tonsil fossæ and the base of the uvula will result in making the free edge of the soft palate quite taut, forming a perfectly straight line (Fig. 442).

There is a type of tonsil not infrequently met with where an enlarged upper lobe lies embedded deeply in the folds of the soft palate. Should a tonsil of this type become adherent as the result of peritonsillar inflammation, so that it cannot be lifted from its bed, its removal becomes a difficult matter. In

one case of this sort we saw after the operation a paralysis of the soft palate result which persisted for several weeks causing great discomfort to the patient because of the regurgitation of liquids into the nose when attempting to swallow.

All in all the operation for removal of faucial tonsils is not a simple procedure. It is not always possible to estimate before the operation the difficulties one may encounter in a par-



Fig. 442.—Type of deformity following amputation of excessive amount of uvula and protractor.

ticular case. These difficulties and the fact that permanent serious results may follow injury to the surrounding structures places the operation for enucleation of the tonsils among those that should always be in the hands of the specialist.

Not the least among the difficulties encountered in operating on the tonsils is the danger from serious bleeding. One hears constantly of cases bleeding to death after tonsil enucleation.

Here again we have no positive way of determining beforehand all the cases that may give trouble from bleeding. In those cases where the danger of hemorrhage results from failure of the blood to coagulate promptly this can be ascertained before the operation and calcium salts administered. When the patient gives a history of a bleeding tendency and when the diagnosis of hemophilia can be made an operation on the tonsils should not be undertaken. A very high blood pressure increases the danger of bleeding and it is well to ascertain the condition of the blood pressure in adults where we have reason to suspect an elevation. It happens not infrequently that infection of the tonsils is suspected as a cause of increasing the blood pressure and because of this removal of the tonsils seems all the more important. We have found the administration of morphin hypodermically in doses of  $\frac{1}{4}$  or  $\frac{1}{2}$  grain just before the operation a good means for lowering the blood pressure and making the patient less nervous during the operation. Tonsil hemorrhage is sometimes serious and the checking of a serious bleeding is not an easy matter. We have had a great deal of experience in checking tonsil bleeding and have so far never had a fatal result. We have found that a most important measure in preventing serious bleeding is to seize the bleeding point with a curved artery forceps immediately on removal of the tonsil and if possible while the blood is still spurting from the severed arteries. Subsequent bleeding is rare where this precaution is carried out. We have not found it desirable to prolong the operation by attempting to ligate the bleeding vessels nor have we ever resorted to the practice of sewing up the pillars to control bleeding. We are not in a hurry to send the patient back to his own room but prefer to have him kept on the operating floor ten or fifteen minutes after the operation has been completed. If at the end of that time there is no bleeding the patient can be sent to his own room. It is unusual for a hemorrhage to occur later provided all bleeding points have been once completely checked. It is not always an easy matter to seize the bleeding vessel especially when the hemorrhage is very free. Gargling with ice water often assists in

one case of this sort we saw after the operation a paralysis of the soft palate result which persisted for several weeks causing great discomfort to the patient because of the regurgitation of liquids into the nose when attempting to swallow.

All in all the operation for removal of faucial tonsils is not a simple procedure. It is not always possible to estimate before the operation the difficulties one may encounter in a par-



FIG. 447.—Type of deformity following amputation of excessive amount of uvula and tonsillectomy.

ticular case. These difficulties and the fact that permanent serious results may follow injury to the surrounding structures places the operation for enucleation of the tonsils among those that should always be in the hands of the specialist.

Not the least among the difficulties encountered in operating on the tonsils is the danger from serious bleeding. One hears constantly of cases bleeding to death after tonsil enucleation.

Secondary hemorrhage after a tonsil operation is especially likely to occur between the sixth and eighth days after the operation. We have seen this take place as late as the tenth day.

Serious complications other than bleeding may follow tonsil operations. Among these the development of a lung abscess is perhaps the most common. Such abscesses, it seems, may occur as the result of a hematogenous infection, but it is probable that in most of the cases the abscess is the result of inhalation of blood and infected material during the operation. In view of the methods often followed in operating on the tonsils, it is indeed surprising that lung complications from inhalation are not even more common. The practice of operating under ether with the patient lying on the back, especially when the so called Sluder technic is employed, is especially favorable for the inhalation of blood and debris from the tonsils. The operator in using this method is inclined to rely more and more on the sense of touch for engaging the tonsil, and frequently completes the operation in a lake of blood which fills the pharynx. We have found that the simplest and most efficient way of avoiding the inhalation of blood during a general anesthesia is to place the patient on his side. The operator sits on a low chair. In this position the blood trickles out of the mouth and it is not at all necessary to obstruct the field of operation by a suction apparatus.

There is another faulty technic which has been responsible for not a few cases of lung abscesses from inhalation. This is the practice of operating under nitrous oxid with the patient sitting upright. This in our opinion is even more dangerous than operating under ether with the patient lying on the back.

Aside from the occurrence of lung abscess, serious systemic complications occasionally follow the tonsil operation. Considering the frequency with which systemic infection develops as a sequel of infection in the tonsil, it is not surprising that the operation for the removal of infected tonsils will give rise occasionally to systemic complications. It has been a surprise to us that such complications are as infrequent as they appear to be. When removing infected tonsils from patients suffering

checking a profuse bleeding. Compression in the tonsil fossa with a sponge saturated with  $H_2O_2$  may also be tried. When the patient is taken to his own room he is left sitting up supported by a back rest with an ice-bag around his neck. Troublesome bleeding may take place any time during the first twelve hours after the operation. When it occurs it is well to give the adult patient a hypodermic of morphin  $\frac{1}{2}$  grain with  $\frac{1}{16}$  grain of atropin. This is especially desirable where the patient is at all nervous. Very often this alone will suffice to check the bleeding. When other measures are called for it is important to bear in mind that a patient soon becomes intolerant of manipulations in the throat in efforts to check hemorrhage. For this reason it is well to make all preparations for effectively stopping the bleeding before beginning the effort. The first step is to cleanse the fossa of clots which will be found filling up the side from which the bleeding occurs. With reflected light using a head mirror, one can usually determine readily just where the bleeding point is located. The most satisfactory method is to seize the bleeding vessel with a curved artery forceps. This is allowed to remain attached long enough to make sure that no more bleeding is likely to occur. Half an hour will be sufficient. Ligation is not to be recommended for the reason that the hemorrhage is adequately stopped by means of the artery forceps and the manipulations necessary to place the ligature only serves to further exhaust the patient. It may happen that owing in part to the nervous condition of the patient one will find it difficult to discover the bleeding vessel. Under these conditions a sponge soaked in  $H_2O_2$  and pressed firmly in the tonsil fossa for a few moments will often stop the bleeding. A more effective measure is to prepare a sponge by moistening in water and then dipping in powdered ferropyrin. When this is pressed in the tonsil fossa it acts as a powerful hemostat. Continued pressure by means of a specially devised tonsil hemostat such as the one perfected by Corwin will sometimes have to be applied. We have had cases where one of these had to be applied in each tonsil fossa and left in position several hours. *After the first twelve hours bleeding is not at all likely to occur.*

indications for the operation clearly exist. On the other hand the possibility of such complications should impress on the mind of the physician that the tonsil operation is not a minor surgical procedure which can be undertaken as a general prophylactic measure even where no well-defined indications are present. The indiscriminate removal of the tonsils as advocated in some quarters is in our opinion to be deprecated.

The development of local trouble in the pharynx after the tonsils have been removed remains still to be considered. This is not an infrequent condition and its possibility should always be kept in mind when one is advising removal of the tonsils. Local trouble arises in several ways. We have already referred to the contractions of the soft palate which result from injury to the fauces and when the uvula has been clipped too close to its base but especially when this structure has unintentionally been caught in the snare when removing the tonsil. We have had occasion also to refer to the infiltration of the lateral bands of the pharynx which develops so frequently when the posterior pillar has been injured. Recurrence of the lymphatic tissue in the tonsil fossa occurs not infrequently from a hypertrophy of the nodule of lymphatic tissue located in the angle between the lower pole of the faucial tonsil and the lingual tonsil. At its lower pole the faucial tonsil shades off imperceptibly and frequently there is a more or less gradual transition from the tissue constituting the faucial tonsil into that of the lingual tonsil so that it is not at all easy to say from inspection of the pharynx just where the one terminates and the other begins. Nodules of lymphoid tissue at the lower pole of the faucial tonsils are not infrequently left after the tonsil operation. Such nodules may cause trouble not alone by undergoing subsequent hypertrophy which constitutes the so called recurrence of the tonsil but more frequently by their retaining a focus of infection which tends to keep up the systemic trouble for the relief of which the tonsil operation was undertaken. Such foci may be shown by the presence of tonsil crypts in which cheesy concretions accumulate and which are not infrequently the seat of recurring acute infection. At other times chronic infection can be dis-

from chronic rheumatism with recurring acute exacerbations it is not so infrequent to observe a more or less acute attack of the rheumatism immediately after the operation. We have come to look upon this phenomenon, on the whole, as a favorable sign, as it is a rather clear demonstration that the systemic trouble for which the tonsils were removed was being caused by the tonsil infection. The acute exacerbation that follows the tonsil removal is in many cases the last of such attacks, and the patient gradually makes a complete recovery from his chronic systemic trouble.

In the same way we have observed the development of acute endocarditis in a patient where there had apparently been no previous trouble of this sort, as a direct complication of the removal of infected tonsils. It is the occurrence of such cases of systemic infection that has led us to the belief that even the complication of lung abscess may occur occasionally as the result of a systemic infection, rather than through the inhalation of blood and infected material from the tonsil which is, we believe, more frequently the cause.

Brain abscess, as well as pyemia with the development of meningitis has been observed as the sequel of the operation for removal of infected tonsils. We have seen a case recently where an adult suffering from various conditions suggesting systemic infection, among which was the presence of a goiter, was found to have badly infected tonsils, which were removed under a local anesthesia. On the third day after the operation the patient developed a septic temperature passed quickly into a state of general pyemia with meningitis and died in a few days. We wish to repeat that while these serious systemic infections occasionally follow removal of infected tonsils the frequency of such complications is much less than we might expect. Considering the large number of cases which are being operated at present for infected tonsils the percentage of cases in which serious systemic infection occurs is extremely low. It is certainly no greater than follows any other operation of similar character. The fact that such complications do occur hardly constitutes an argument against removal of tonsils when the

ways be kept in mind. There is a general impression that the singing voice may be permanently injured as the result of enucleation of the faucial tonsil. The same impression existed as regards the amputation of the tonsil formerly practised. In view of the symptoms in the pharynx which occasionally persist after the tonsil operation, it is not surprising that harmful effects to the singing voice may sometimes be noticed. I do not think we are ever able to promise a patient positively that such a result may not take place. As a rule however, where a tonsil operation is undertaken in a singer, the indications would warrant the operation even though there may be some chance of an unfavorable action on the singing voice. The condition for which the operation is undertaken, for example, frequent attacks of acute tonsillitis is much more of a menace to the voice than is the removal of the tonsils. Whenever the removal of the tonsils is contemplated in a singer the situation should be gone over very carefully with the patient, and in case the decision is reached to operate the greatest care should be exercised in doing the operation guarding especially against injury of the pillars. In our opinion, the operation under local anesthesia is much less likely to result in such injury than where ether is employed.

covered in these lymphatic nodules from which pus can be expressed

Much more troublesome are the nodules of tonsil tissue which sometimes remain at the upper pole after the tonsil operation. Such nodules very often cause trouble, either as the seat of attacks of acute tonsillitis or as the focus of distinct tonsil abscesses. Occasionally, after what appears to be a complete enucleation of the tonsil one discovers a fistulous passage leading into the scar usually about the upper or middle thirds of the fossa. Such fistulæ are, as a rule, the seat of a chronic infection from which cheesy masses or even pus can be expressed. In other cases the fistulous tract becomes the seat of recurring acute infection. The slitting open of such fistulæ will not suffice to cure the difficulty. The scar in this locality must be dissected away, when a smaller or larger nodule of tonsil tissue will be uncovered. This must be removed before the tonsil trouble will disappear. The occurrence of nodules of this sort is much less frequent when the operation has been performed by an expert in this sort of work, but our experience from examining patients operated elsewhere has shown us that this may happen in the hands of any operator.

Annoying local symptoms in the region of the tonsil fossa persisting after the throat has healed are also observed in some cases. Sometimes this is in the nature of an annoying dryness. At other times the patient experiences a sensation of constriction and even of severe neuralgic pain. This pain sometimes radiates up to the ear. It is present after a great many tonsil operations, especially in adults, but disappears usually after a few weeks. We have seen cases where it has lasted six months. As far as the annoyance from the scar formations in the fossæ is concerned, this gets better as time goes on and the scar formations undergo some absorption. The annoyance from the sensation of dryness is likely to be much more persistent. Many of the symptoms in the pharynx which persist for a long period after a tonsil operation are not unlike the paresthesias associated occasionally with any form of chronic pharyngitis.

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## CLINIC OF DR ALBERT J OCHSNER

### AUGUSTANA HOSPITAL

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## COMPOUND COMMINUTED FRACTURE OF BOTH BONES OF THE LEG

*Summary* History immobilization of no value in this case operation—condition of bones—fixation by means of chromicized catgut—closure dressing

**History**—The patient, a married woman of forty two years, was admitted to Augustana Hospital August 19 1918, with a compound comminuted fracture of both bones of the leg at about their middle

Her family history is negative February 19, 1917, she was admitted to this hospital suffering from a comminuted fracture of the lower end of the right tibia and fibula, with a dislocation of the ankle. Under an operation the fracture was

present injury

**Comments and Operation**—DR OCHSNER From the amount of traumatism present it is plain that a satisfactory result can not be expected from the simple use of immobilization The soft tissues have been perforated at two points by fragments of the fractured bone There is undoubtedly a considerable amount of muscle and fascia between the ends of the fragments, which are badly displaced The question remains as to whether it will be best to make use of a temporary immobilization until the external wound has been healed, and then to perform a secondary operation, probably with the use of Lane plates, or whether it would be better to expose the fracture at once, adjust the fragments, and hold them in position artificially The latter method seems preferable

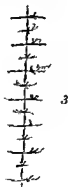
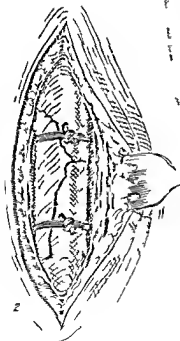


Fig 413—A comminuted fracture of the middle of both bones of the leg.  
 1  $\times$  Ray appearance of fracture. 2. Through an anterior incision the fragments of the tibia were freed of all loose bits of torn muscle and blood-clots. The wedge-shaped piece of bone was fitted in place and fixed by means of two circular ligatures of chromicized catgut. Each ligature consists of four strands of the heavy gut.  
 3 The wound closed by alternate tension and coaptation sutures.

After thoroughly scrubbing the entire surface with benzine and then painting it with tincture of iodine we make an incision directly over the spine of the tibia 30 cm in length in order to expose the fragments carefully. The fractured tibia shows the condition illustrated in Fig 443 1. Between the two main fragments there is a wedge-shaped piece which is adherent to its periosteum and which it is possible to place in its original position by manipulating the two ends so that it gives the appearance shown in Fig 443 2.

The question now arises as to the advisability of fastening this fragment in place by means of a Lane bone plate or holding it in position by means of wire ligatures or by the use of chromicized catgut. The last method has been chosen. No 2 chromicized catgut is threaded double through the eye of a curved needle making a strand of four filaments. The needle is carried around the bone and the catgut carefully tied as shown in Fig 443 2. The leg can now be moved without displacing these fragments. The periosteum is sutured in place and the skin is sutured over the periosteum as shown in Fig 443 3. The wound is sutured with silkworm gut sutures throughout which will be left in place for six weeks until the cast is removed. A dressing is placed over the entire surface and a cast is applied including the foot and thigh care being taken not to displace the fragments and also to secure a perfect position of the tibia and fibula the knee being very slightly bent. The foot is placed at a right angle in order to facilitate walking after the fracture is healed. If one permits a plaster of Paris cast to harden with the foot in an equinus position it usually requires several weeks of practice after the bone has been united before the patient can walk with any comfort.

The advantage of using a bone plate in a case of this kind is of course in the fact that it will hold the fragments absolutely in position but in compound fractures we have always preferred to make use of fragments of bone rather than of foreign bodies.



## PLASTIC ON FACE

*Summary* History the best time for the correction of deformities of the face following gunshot wounds condition of face in present case technique of repair of lip correction of ectropion—Thiersch graft—closure after-care

**History**—The patient a man about forty was admitted to Augustana Hospital because of a deformity of the face

One year ago the patient was shot by tripping over a shot gun Shortly after the accident he consulted Dr Ochsner in order to have a plastic operation performed but was advised against it because of the inelasticity of the tissues and the great amount of scarring present He was advised to return in six months

The entire left side of the face is deformed by a hollowing out of the cheek and a portion of the ear The resulting scar formation has produced a marked ectropion of the left eyelid His chief complaint is an overhanging of the upper lip at the left corner in such a way that there is a continual drooling and it is for the correction of this that he comes to the hospital There are eight duck shots still remaining subcutaneously over the mastoid region

**Comments and Operation**—**DR OCHSNER** In correcting deformities such as the one illustrated in Fig 444 following gunshot wounds that have carried away a considerable portion of the face there are two times when the surgeon can do most for the patient namely at the time the injury occurs when what is left of the face can be placed in the most favorable condition for future use and second after the scar has become thoroughly soft and pliable There is a time between these two stages when surgical treatment is not likely to be very satisfactory in its results because the tissues are not pliable and because of the inelasticity which must be taken into account in reconstructing these deformities

The patient before us consulted Dr Percy and myself some six months ago when all the scars were severely congested and

we advised him to postpone operation until the present time. The contracting scar-tissue has pulled outward the angle of the



Fig 444.—Deformity of face and cheek with spider like contracture bands caused by a gunshot wound. Note the overhanging and laterally displaced upper lip, ectropion of the lower eyelid, and loss of substance of part of the left auricle. A number of buckshot are embedded in the skin over the mastoid region.

mouth to a point halfway between its normal position and the position of the ear. From the same cause the lower eyelid has

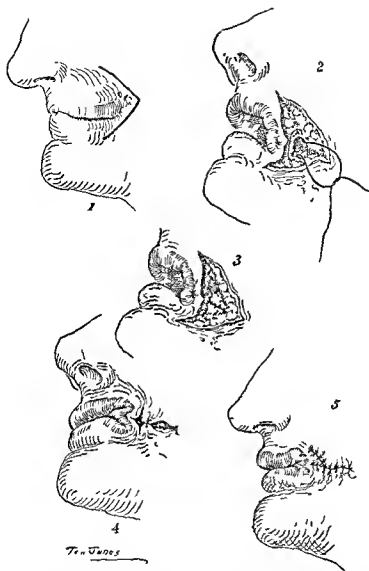


Fig 445 —Plastic operation on the angle of the mouth with the object of bringing the upper lip in apposition with the lower and thus prevent drooling 1 An angular incision about the corner of mouth 2 The incision carried down through the buccal mucosa. Separate sutures being applied to mucous membrane in such a way that the knots come within the oral cavity 3 The mucous membrane completely sutured 4 The corner of the mouth pushed medially and held in position by stitches as shown 5 The incision closed, showing also the appearance of the corner of the mouth Note the great degree of overcorrection.

been drawn down so as to expose its mucous membrane and to prevent closure of the eye, giving rise to a marked ectropion of the lower lid

It becomes necessary to make a wedge-shaped incision, as indicated in Fig 445, 1, in order to make it possible to slide the angle of the mouth forward a distance of 3 cm. In all these conditions, in order to correct the deformity sufficiently, it is absolutely necessary to overcorrect. Otherwise, when a future

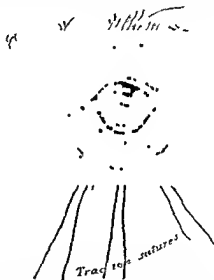


Fig 446 —Ectropion of the lower eyelid in the same case. The line of incision with traction sutures in place

contraction of scar tissue occurs the deformity will in a measure recur. As the scar tissue extends through the entire thickness of the lip, it becomes necessary to carry the incision through its entire thickness including the mucous membrane as shown in Fig 445, 2. The mucous membrane is sutured from within so that the knots of the sutures are tied on the buccal side of the incision, leaving the line of closure free from suture knots, as shown in Fig 445, 3. The angle of the mouth is then drawn

forward and the wound is closed as shown in Fig 445 4, 5, carrying the angle of the mouth slightly farther forward than normal. This resulting deformity will however, correct itself very rapidly after the wound is healed.

By making use of one or more such triangular incisions one can overcome a large majority of the deformities of the face that one encounters.

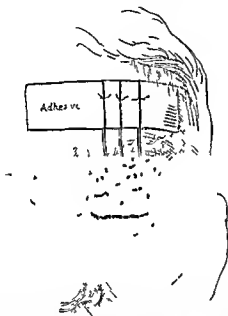


Fig 447—The lower eyelid has been freed by under dissection and the traction sutures attached to an adhesive band on the forehead in order to keep the edges of the incision apart.

The correction of the ectropion is even more simple than the correction of the deformity of the face. Here again overcorrection is absolutely necessary. The lower lid must be kept in an exaggerated position of elevation for a period of two weeks at least. This is accomplished by placing fine silk sutures in position, as indicated in Fig 446. An incision is then made directly in front of the border of the infra-orbital bone, as shown in Fig 446. The skin and fascia are then dissected loose, ex

posing a raw surface 4 cm long and 2 cm wide as shown in Fig 447. The lid is then carried upward over the eye by means of three silk sutures and fastened in this exaggerated position by tying them over a rubber adhesive strip fastened to the patient's forehead as shown in Fig 448. The rubber adhesive strip is reinforced in order to increase its security by a second strip as shown in Fig 448.

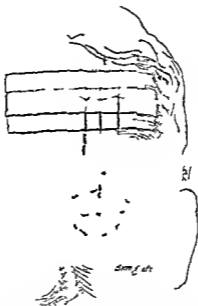


Fig. 448.—Operation completed. A Thiersch skin-graft has been applied over the exposed raw surface and a second adhesive band applied over the first to fix the stitches.

A Thiersch skin graft is carefully cut from the patient's thigh in the exact form and size to which the skin has been retracted as shown in Fig 448. The skin graft is placed directly upon the fresh wound and very carefully adjusted. No dressing is placed over this skin graft but it is protected against trauma by means of a wire splint extending from the forehead to the cheek and nose.

The silk sutures are kept in place for two weeks so that no motion of the eye can cause a disturbance of the skin graft. In a week or ten days this will have healed entirely and then the ligatures will be cut and the eyelid will recede a little but not sufficiently to overcome the correction. The eye will again remain thoroughly covered the ectropion will disappear, and the slight deformity caused by the skin graft will soon become much less noticeable.

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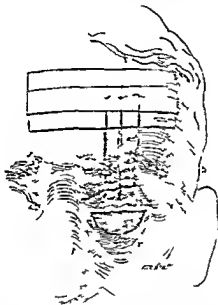


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# CLINIC OF DR HERMAN L KRETSCHMER

## PRESBYTERIAN HOSPITAL

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### HEMATURIA AND PURPURA

*Summary* A case of painless profuse hematuria—method of examination—demonstration of the pathology analysis of the literature bearing on the relation of hematuria to purpura on the general features of the disease the differential diagnosis common diagnostic errors etiology and pathologic anatomy complete bibliography

My interest in the subject of hematuria occurring in purpura was stimulated by the following case which was kindly referred to me by Dr D B Phemister in September, 1917, because of the presence of painless profuse hematuria

The patient was first admitted to the Presbyterian Hospital two years ago when Dr Phemister operated on him for osteomyelitis of the head and neck of the femur Last spring he had a rash on the legs, which was called urticaria by his physician The eruption disappeared in three or four days and was followed by hematuria which in turn disappeared in a week or ten days Since this first eruption the patient has had four or five similar attacks each accompanied by hematuria

After recovering from his operation he left the hospital and was sent to a sanitarium where he remained for a month and a half While there he had one of his attacks, he noticed masses of red pin point spots around his ankles and lower legs With rest in bed these spots began to get paler within three or four days At the same time the patient noticed that he passed blood in the urine, this hematuria persisted for a week or a little longer during which time the spots had nearly entirely disappeared The urine then became clear and the spots returned, they remained for a week or more when they again began to disappear and blood was again noticed in the urine This



crete, and confluent rash upon the lower third of each leg, most marked on the anterior surface of the ankles. It was accompanied by itching and had a tendency to disappear when the patient was warm, usually being absent in the morning and reappearing when the extremities were exposed to cold. On September 19th these purpuric spots were present over both malleoli of the left foot along the inner aspect of the foot down to the sole, on the dorsum of the foot and a few hemorrhagic spots were seen on the toes.

The urine was alkaline, contained both nucleo and serum albumin, specific gravity, 1014, there were a few granular casts and leukocytes some erythrocytes, and blood macroscopically.

Blood examination showed 4 460 000 erythrocytes, 7600 leukocytes, hemoglobin 47 per cent, blood pressure, systolic, 110, diastolic, 55.

*Cystoscopy revealed several small patches of submucous hemorrhage in the base and apex of the bladder. Many of these areas of ecchymosis were found around or in front of the left ureteral orifice. They varied in size from the head of a pin to  $\frac{1}{2}$  inch in diameter.*

**Ureteral Catheterization**—Easy and without obstruction. Prompt flow of urine from each side. Examination of catheterized specimens showed

Right kidney 1020 leukocytes per cubic millimeter

Left kidney, 400 leukocytes per cubic millimeter

Bladder, 250 leukocytes per cubic millimeter

**Cultures**—Right kidney sterile, left kidney sterile bladder sterile.

Examination of all specimens negative for tubercle bacilli.

Roentgenography was negative for the presence of calculi in the urinary organs.

From a review of the literature on this subject, one is impressed by the lack of urologic reports both as regards the number of cases that have been reported by genito-urinary surgeons as well as by the scarcity of cases reported in which a complete genito-urinary examination was made. Doubtless this is in a measure due to the fact that most of these cases are seen

same sequence of alternate petechiæ and hematuria went on for eight months six of which the patient spent going to school and the remainder in vacation.

His present attack for which he was admitted to the hospital this time began on Monday September 3 1917 following his return from a trip to Fort Sheridan. Blood in the urine has been present continuously since September 3 1917 but it seemed to be decreasing in amount. There was some slight burning on urination on the 5th which had not been present before. Patient urinated from three to four times daily and as a rule once at night. Pain in the back was present for the first time during the present attack. It was of a dull aching character and was located in both lumbar regions. The patient has had attacks of nausea through the day but did not vomit. At the onset of the present attack he vomited and thinks that he also had some fever. Headache frontal and very severe bothered him from the onset until after he had been in the hospital for some time.

The patient states that he felt very weak during the eight months that he was at home. He was never dizzy nor did he notice any blurring of vision and yet at times he says he thought he would fall. There was never any swelling of the face or ankles and he had no pain except an occasional stomach ache. He says he vomited frequently while in the hospital before.

His appetite is good he sleeps well his bowels are regular he has no sore throat, cough or night-sweats and there is no history of a similar ailment in any other member of the family.

**Physical Examination**—Head and neck negative. Chest. Heart and lungs negative.

Examination of the abdomen reveals the upper border of the liver in the fifth interspace the lower border is about a fingerbreadth below the costal margin. The spleen and left kidney are not palpable whether or not the right kidney is palpable is doubtful. There is a slight tenderness on fist percussion over each kidney posteriorly most marked on right side.

Examination of the skin eruption on September 7th four days after admission revealed a pink red maculopapular dis-

Nelson's case was that of a dentist, aged thirty six. The trouble began as a scanty discharge of pus from the urethra, lasting three or four days. Then the discharge assumed a bloody character. Urethroscopic examination showed slight congestion of the mucous membrane throughout the entire length of the urethra. In the first inch of the canal there were numerous bleeding pin point openings, red spots, and a pale, flat papule about the size of a split pea, surrounded by a few dilated capillaries on the lips of the meatus. A cystoscopic examination was then made, which showed a hyperemia of the trigone, minute punctate spots and dilated capillaries at the internal urethral (vesical) opening, which explained the terminal hematuria. The rest of the bladder appeared to be normal.

Walsb's case was that of a female, aged twenty three, who consulted the author because of intermittent hematuria and cystitis. Cystoscopic examination showed bladder capacity normal. The mucosa throughout, but particularly that covering the fundus and lateral walls, was studded with punctate hemorrhagic areas none of which at the time was actively bleeding but which showed that bleeding had recently taken place therefrom. The urine for several hours previous to the examination had not contained blood microscopically. Catheters were placed in the ureters, urine from both kidneys being obtained. The urine from both sides appeared normal, and it was evident that the source of blood previously found was from these hemorrhagic spots in the bladder mucosa.

Kidd reported a case of purpura of the bladder that occurred in a girl aged twelve. The onset was characterized by sudden desire to pass water and severe pain in the left iliac region. The patient had a sore throat for some days before the onset of the hematuria. *Cystoscopy* Scattered over the fundus and trigone were seen patches of submucous hemorrhages, varying in size from a pin head to a six pence. The patches were of all shapes and sizes, some linear, some stellate. Kidd is inclined to believe that his case was one of secondary purpura, confined to the bladder and arising in a bacterial infection of

by the internist or family physician, and, therefore careful urologic study of the cases is not carried out

In a somewhat brief review of the literature I have collected reports of 90 cases. In this group of cases I have been able to find reports of cystoscopic examinations in but four instances, those reported by Kidd, Walsh, Nelson, and Blum.

As a rule, the origin of the bleeding is said to be from the kidney, but in some cases at the time of examination the kidney had doubtless stopped bleeding, so that the only evidence when cystoscopy was carried out was the presence of bladder ecchymoses.

Blum has described, under the name of purpura hemorrhagica, a condition which occurs in men and women of different ages, generally after some affection of the mucous membranes, as a cold, influenza, or angina. Cystoscopic examination at this stage shows multiple hemorrhages of the mucous membrane scattered over the whole of the inner surface of the bladder, not confined to the trigone and base of the bladder. These hemorrhagic spots later become transformed into hemorrhagic erosions and finally into ulcers. Nowhere in his report does he mention the presence of other manifestations of purpura, except that the patients with purpura vesicæ are subject to attacks in the spring and fall.

Blum, in describing the condition known as "ulcus simplex vesicæ pepticum," calls attention to the cystoscopic findings. He says that cystoscopic examination showed multiple hemorrhages of the mucous membrane scattered over the whole of the inner surface of the bladder, *not* confined to the trigone and base of the bladder. The hemorrhages are bright red, dark red, or bluish black, according to the stage of the affection. These hemorrhagic spots later become transformed into hemorrhagic erosions and finally ulcers. All spontaneous ulcerations of the bladder are preceded by hemorrhagic lesions. The formation of ulcers from hemorrhagic lesions is due to the peptic properties of the urine. These ulcers of the bladder are analogous to ulcer of the stomach. Prophylactic treatment and treatment in the early stage consists in keeping the urine alkaline.

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the tonsil, though it is possible to look upon it as a case of Werlhof's purpura

Many of the cases of purpura show, upon careful study of the urine, the presence of a coexisting nephritis. In a large number of the cases reported nothing is contained in the findings with reference to the presence of nephritis. That this may be more common than is generally supposed is evidenced by the reports of Osler, who reported nephritis in 7 cases. In the case reported in this paper, repeated examinations of the urine showed the presence of granular casts.

According to Hutinel, the nephritis, like the purpura, generally results from intestinal infection, changes in the liver, or disturbances of the blood producing function. Nothing is more common than to see several reinfections in cases of intestinal infection. Each of these attacks serves to aggravate the renal condition. Many cases of persistent nephritis of unknown origin, he thinks result from digestive disturbance, particularly the nephritis of purpura. Of course the coincidence of scarlet fever and purpura might well give rise to a particularly severe form of nephritis.

He reports 3 cases of an associated nephritis in purpura. One case was that of a little girl of three and a half years who was admitted to the hospital with scarlet fever. In addition she had purpuric eruptions on elbows, feet, and legs with hematuria and albuminuria, vomiting, and abdominal pain. She was given Witte's serum, following which the hemorrhages ceased, and she was discharged from the hospital with an almost normal urine.

The second case was in a boy of five who had purpura, albuminuria, hematuria and bloody stools. He developed scarlet fever while in the hospital under treatment for the original trouble. Recovered, but still had albumin in urine two and a half months after onset.

The third case was that of a little girl with a rheumatoid purpura complicated with intestinal hemorrhage and hematuria followed by nephritis from which she died eighteen months later.

The author states that the mortality in the nephritis of pur

pura is quite high, as this form of nephritis tends to become chronic. Scarlatinal nephritis, on the other hand, is seldom fatal.

Burt reports a case of a boy of eleven, who one year after the removal of tubercular glands of the neck began to bleed from the gums. This was followed by the appearance of hemorrhagic spots scattered over the body, but mostly on the extremities. Urine showed abundant hyaline and finely granular casts, moderate amount of cellular and coarsely granular casts, trace of albumin, few red and white blood cells. He continued to bleed from gums, and also passed much blood from bowels and vomited blood. He died on the tenth day.

Eschhorst reports 3 cases of patients suffering from a form of Werlhof's disease which he does not find described in the literature. He calls it the chronic nephritic form of purpura hemorrhagica. They had the typical signs of Werlhof's disease, to which a hemorrhagic nephritis was added. They recovered from all signs of the disease except the hemorrhagic nephritis which remained for years and resisted all forms of treatment. One case was in a girl of fifteen, one in a man of twenty five, and the third in a boy of eighteen.

In looking up the literature on the subject he found that in Hebra and Kaposi's "*Lehrbuch der Hautkrankheiten*" there is a footnote saying that Kaposi in a case of recurrent peliosis rheumatica observed periodically recurring kidney hemorrhages which were not coincident with the purpuric attacks.

As a result of a study of his cases Eschhorst concludes that chronic hemorrhagic nephritis is most apt to appear in those cases of hemorrhagic purpura which have a chronic course and show a tendency to recurring attacks of purpuric eruption. There are two forms of this chronic hemorrhagic nephritis: those of the interstitial and parenchymatous types. Uremia is not seen in these patients, so that the prognosis as to life may be given as good but as to complete recovery very doubtful. He says the causes of Werlhof's disease are unknown.

Osler reports 7 cases of acute nephritis with purpura. One case in a girl of fifteen, which began as an erythema over the

cheeks and nose, with puffiness of one small joint and edema of one eyelid. Three months later she had a severe attack with areas of angioneurotic edema, intense swelling of the face, and an acute nephritis, which proved fatal seven months after the first appearance of the erythema.

The second case was in a boy of fourteen who was admitted to the hospital with the diagnosis of appendicitis. One week before admission he had a purpuric eruption on the legs with high-colored urine. He had never had any similar attacks though he had had irregular colicky pains at times. Osler in showing the case to his class remarked how interesting it was to see a case of acute hemorrhagic nephritis without any diminution in the amount of urine, no swelling of the face, and no edema. Recovery.

The third case was in a boy of twelve. It began as an otitis media followed by an extensive purpuric rash with acute nephritis. Subsequent death from meningitis as a result of the otitis media.

The fourth case was in a girl of six, with purpura, pains in the knees and ankles, acute nephritis with blood, albumin and tube-casts in the urine.

The fifth case was in a woman of twenty-four. It began with an erythema of nose and cheek extending to elbows and arms in the form of wheals, with some purpuric spots, followed by pneumonia but no kidney symptoms. Eight months later she developed an acute nephritis and died in a uremic convulsion. The acute nephritis came on without any special exposure. No skin rash.

The sixth case was in a boy of five. Began as an acute otitis followed by hemorrhage from the bowels, purpura and acute nephritis. Recovery.

The seventh case was in a physician of twenty-nine. When a boy he had an attack of hemiplegia with aphasia, lasting a week. Within a year he had five or six attacks. At the age of twenty-eight he had a mild attack of rheumatism, with angioneurotic edema of the upper lip and some urticaria. The next year he had attacks of abdominal colic with pain in the

leg purpura and urticaria. The following year he had hematuria and albuminuria which the patient himself considered as only a part of his old trouble.

Prentiss reports a case of purpura hemorrhagica rheumatica with nephritis present in one attack.

Sutherland describes 2 cases of Henoch's purpura in children with nephritis. One was in a boy of three and the other in a girl of ten. Both cases recovered.

Thacher in discussing purpura says that nephritis is not an uncommon accompaniment with marked glomerular changes and much epithelial destruction.

Cases of purpura are often associated with attacks of abdominal pain. Because of these attacks of abdominal pain errors in diagnosis have occurred so that the patients have been unnecessarily subjected to surgical operations. That these mistaken diagnoses and further unnecessary operations have been recorded is evidenced by the 8 cases reported in the literature.

Barling in the British Medical Journal for 1913 reports a case of a boy aged four. The mother gave a history of attacks of abdominal pain accompanied by rash. He was admitted to the hospital twenty hours after the beginning of the last attack of pain. Intussusception was suspected and the child operated. At operation the appendix cecum and part of the ileum were found invaginated into the colon and these organs showed extensive interstitial hemorrhage and some inches of the small bowel were black and apparently gangrenous. The part of the ileum above the obstructed portion was distended for some distance by dark blood stained fluid lying in its lumen. The gangrenous portion of the bowel for a distance of 12 inches was excised. Examination of the piece of bowel removed showed that the portion next to the ileocecal valve was gangrenous for some 4 or 5 inches above this were two short segments each about 2 inches long with thickened walls and separated by a portion of apparently normal bowel. On section through the thickened segments the bowel wall was found infiltrated with blood measuring nearly  $\frac{1}{2}$  inch from the peritoneal to the mucous surface. The patient recovered.

Greig in the *Scottish Medical and Surgical Journal* for 1908 describes a case of Henoch's purpura simulating intussusception in a boy of nine years and four months in whom operation was performed. The tumor found before operation proved to be due to a great congestion of the lower end of the ileum which projected as a distinct collar into the cecum. There was no obliteration of the lumen for the finger could easily be entered through it by inverting the bowel.

Harrington in the *Boston Medical and Surgical Journal* for 1905 reports a case of angioneurotic edema in a girl of twenty-six who was admitted to the hospital with symptoms of gallstones. At operation no hemorrhagic areas were found in the intestinal walls but at a point within a short distance of the ileocecal valve there was a cylindric enlargement of the ileum increasing the bowel circumference to twice its ordinary size. The engorgement of the intestines and the free fluid were explained by the violent peristalsis brought on in the effort to force down the lesion which was actually in the intestinal wall.

Jacobson in the *Medical Record* for 1903 describes a case of hemorrhagic appendicitis as the first manifestation of purpura hemorrhagica. The patient was a woman of thirty-seven who was admitted to the hospital with symptoms of appendicitis. At operation the appendix was found to present numerous areas of hemorrhage into its substance. After operation she had profuse nasal hemorrhage and petechiae appeared on legs and abdomen but there was no hemorrhage from the bowels or kidney. The patient made an uneventful recovery and had no recurrence of the hemorrhage.

Mitchell in the *Annals of Surgery* for 1913 describes 2 cases of purpura with symptoms indicating surgical operation and in which operation was performed. One case was a boy of twelve admitted to Dr Crook's service in 1905. He had been ill for a couple of days with acute abdominal colic, slight fever and vomiting. There was general abdominal tenderness and rigidity most marked in the right iliac region. Dr Crook operated and removed the appendix. Mitchell saw the boy in consultation three days later because the colic had not cleared

up and the findings in the appendix did not explain the symptoms. The appendix was congested and its superficial vessels distended. Inspection of the last 2 feet of the ileum showed that it also presented the same appearance and that the Peyer patches all seemed enlarged, dark in color and projecting from the surface of the bowel, much resembling the condition seen in typhoid fever. No actual hemorrhage into the peritoneum or viscera was found, but the whole peritoneum was congested. Examination at the consultation showed slight abdominal distention with no actual spasm and no sign of peritonitis. Legs were covered with purpuric spots. No spots on the arms or trunk and no joint tenderness was present. A diagnosis of Henoch's purpura was made and the condition cleared up rapidly.

The second case was that of a girl of five. The history was that of abdominal disturbance beginning shortly after birth and the vomiting of blood at the age of two. At the age of four she had an acute illness with a temperature of 103° F, great abdominal pain and intestinal hemorrhages for several days. One month later she had a similar attack and was operated. At operation no abdominal findings were present except a general intestinal distention. One year later she had a similar attack of pain in which blood was vomited. She was brought to the hospital in a state of collapse with a temperature of 96° F and pulse practically uncountable. With the administration of horse serum there was a complete cessation of the hemorrhage and she rapidly recovered. After that she had one or two mild attacks characterized by the vomiting of bright blood and the presence of bright blood in the stools. With each attack there were purpuric spots on the limbs, intense abdominal pain and pain in the joints.

Osler in the *American Journal of the Medical Sciences* for 1914 reports a case of a girl of seventeen who was brought to the hospital because of severe recurring attacks of abdominal pain. An exploratory incision was made but no cause for the trouble was found. Three months later she was admitted to another hospital in paroxysms of pain with the knee joints slightly swollen and tender but no fever or skin eruption.

Readmitted to the hospital six weeks later because of severe colic and nausea. This time she had recurring attacks of bleeding from the nose and once bleeding from the gums, but no skin eruption. She remained in the hospital nine days and was discharged much improved.

Burrows, in the *British Journal of Children's Diseases* for 1904, describes a case of Henoch's purpura in which operation was performed with a probable diagnosis of appendicitis. On opening the abdomen the appendix was found to be normal. So far as could be seen the greater part of the small intestine was pale and nearly empty. Just as the abdominal incision was about to be sutured a portion of congested small intestine was seen. It was found to be the ileum a few inches from the ileocecal valve. The bowel showed several small petechial hemorrhages and some irregular patches of congestion from which the blood could be expressed. Over the congested areas the peritoneum was sticky and had lost its gloss.

Next day a search was made for other petechiæ and some small purpuric spots found. Further questioning of the mother elicited a history of a purpuric eruption before the abdominal attack.

The cases reported by Harrington, Mitchell, Osler and Burrows were all erroneously operated on. In addition to these cases, Sutherland reports one in a boy of five, who was operated for intussusception, but the condition not found. The case proved to be one of Henoch's purpura.

Mitchell calls attention to the fact that purpura very often simulates surgical conditions. He says the importance of the condition surgically lies in the fact that the abdominal symptoms may be so striking as to lead one to open the abdomen. He quotes the statement made by Pratt that a review of the literature showed at least 6 patients who had been subjected to exploratory operation under this illusion and he also calls attention to Jacobson's case of purpura in which a hemorrhagic appendix was removed under the diagnosis of acute appendicitis.

Mitchell also says that in looking over the cases of purpura where operation has been performed one is struck by the fact

that the chief seat of the lesion is in the ileum, especially the lower part, in the neighborhood of the ileocecal valve. All grades of lesions can be traced, from simple hemorrhage or edema to intussusception, gangrene, perforation, peritonitis, and death. From the data obtained on the operating table a clear picture of the pathology can be drawn and the abdominal symptoms readily explained. In the cases of Crook and Burrows there was nothing more than congestion with localized small hemorrhages in the lower portion of the ileum. In the case of Harrington there was a definite ring of edema in the lower portion of the ileum, causing a local paralysis equivalent to a local obstruction. This readily explains the paroxysmal abdominal pain caused by the intestine attempting to overcome this obstruction and dragging on its mesentery with each contraction. Cook and Mills both saw several similar edematous rings at intervals along the ileum. Greig suspected intussusception in his case, and felt a tumor before operation, but when the abdomen was opened and the tumor delivered it proved to be a great congestion of the lower end of the ileum projecting as a collar into the cecum without obliteration of the lumen.

*Intussusception* is by far the most frequent and most serious intestinal complication, and each step in its production can be seen in the various lesions described in operative reports. It is most often ileocecal but may be enteric. Nobecourt reports one instance of perforation of the duodenum 15 cm. from the pylorus and Silverman reports a death from gastric perforation. Aside from these two isolated accidents, the lesions seem to be pretty constantly confined to the lower ileum.

In a review of the literature by no means exhaustive, Mitchell found 19 cases in which laparotomy had been performed. In 11 nothing was found which demanded operation and in the majority of these intussusception was suspected—9 of these recovered, 1 died in eight hours, 1 later of pneumonia, 1 in three weeks of nephritis. In 8 cases intussusception was demonstrated at operation, 4 being treated by resection and 4 by reduction, with 3 recoveries by each method, 3 were unoperated, with 1 recovery, making 11 cases of intussusception.

In the majority of cases there is not absolute occlusion of the bowel, the intussusception is undoubtedly caused by a primary area of edema or hemorrhage, usually in the lower ileum acting as a definite obstruction. In the presence of abdominal crises it is justifiable to assume the existence of such an area.

Pain is one of the important symptoms in the majority of cases of purpura. It has been found present in all the cases with gastro-intestinal symptoms and in many cases with joint symptoms, especially in those cases with an associated rheumatism or tuberculosis.

Bauch has described 3 cases of purpura hemorrhagica in chronic tuberculosis, in all of which the patients complained of pain in the joints coming on suddenly and simultaneously with the onset of the rash. In 2 cases the cutaneous hemorrhages were of the simple type. In the third case the patient's stools showed traces of blood, evidently suggesting purpura hemorrhagica proper. All 3 cases had edema of the extremities and diarrhea, and one showed, in addition, albumin and casts in the urine.

Bristowe reports 2 cases in boys of fifteen and ten years respectively, in which the illness began with pain in the bowels and melena. In both cases there was persistent hematuria, derived not from the urinary passages or reservoirs, but from the glandular substance of the kidney. In both from the beginning there was a recurrent purpuric urticarial eruption affecting mainly the extremities. In one case there was sponginess and bleeding from the gums and in the other case there was epistaxis. Both cases recovered.

Osler reports 13 cases of purpura hemorrhagica with pain in various parts of the body, of which 10 had severe abdominal colic, 1 pain in hips, 1 in knees, 1 both joint pains and abdominal colic.

Prentiss reports a case of purpura hemorrhagica rheumatica in a boy of thirteen which began with swelling of all joints, pain, especially in knees and ankles, a purpuric eruption over entire body, and pain in stomach and vomiting. This attack cleared up on a diet of milk and Mellin's food. Six months

later he had a second attack, with hemorrhages from bowels and bladder and in large patches into the skin

Fifteen cases of purpura hemorrhagica with gastro intestinal crises have been reported, 11 by Osler and 1 each by Binet, Bristowe, Sutherland, and Jacobson. In all of these cases there was present either hematuria or hemorrhage from the bowels. Nine were in males and 6 in females. Hematuria was present in 9 cases. In 4 cases it is stated that there were no urinary findings, in 4 these were not recorded. The other 8 cases showed microscopic blood 6 of which also had albumin.

As to the cause of the abdominal crises in purpura Lavalée says it is unknown. Some authors consider them to be of nervous origin. He says that the slight inflammatory changes in the arterioles noted by Hayem and the lesions in the liver and the kidneys are of infectious origin, and that the nervous phenomena might also be explained by infection of indeterminate origin, possibly multiple. The small vessels are particularly affected, and this may lead to small hemorrhages in the skin, intestine, and meninges, which may end in necrosis. Such hemorrhages in the intestines undoubtedly explain the intestinal invaginations in the course of purpura. Intestinal spasm is frequent in abdominal crises, due to increased peristalsis caused by annular hemorrhages. This theory of an infectious pathogenesis would explain the frequency of purpura in cases of hereditary syphilis.

Couty was the first to try to explain the pathogenesis of the gastro intestinal symptoms. He considered them nervous in origin. He did not think them due to brain infection. He said the symptoms in his cases were more like those of lead-colic, and concluded that they were due to the sympathetic nervous system.

Faisans, in a later work considered that the origin of these symptoms was spinal and not sympathetic. Henoch published the first case where the gastro-intestinal infection was found to be the cause of purpura. Aiello in 1894, also believed in this gastro-intestinal origin of purpura, and reported the case of a soldier in whom a purpuric eruption came out in the course of

a very severe digestive disturbance. There are however undoubtedly two distinct classes of cases: those in which the gastro-intestinal disturbance causes the purpura and those in which the gastro-intestinal symptoms occur during the course of a purpura of other origin.

Calmels believes that the congestion of the gastro-intestinal mucous membrane often accompanied by hemorrhage and the subperitoneal ecchymoses certainly play a part in the production of the gastro-intestinal crises. It is hard to say whether the localization of the ecchymoses in such and such a region explains the clinical picture of the pain crises: that is whether they simulate appendicitis, hepatic colic, etc. He concludes that the gastro-intestinal lesions do not entirely explain the crises but that they are due in part at least, to a reaction of the nervous system to the causative agent of the purpura.

Osler says that the anatomic conditions associated with the visceral symptoms are not well understood but the changes in the gastro-intestinal canal at least are probably the counterpart of those which occur in the skin: namely exudation of serum, swelling, hemorrhages and in rare instances necrosis. At autopsy hemorrhages have been found in the internal organs.

Some authors claim that the purpura is caused by tuberculosis. Bauch finds the following facts in his cases to substantiate such a theory:

(1) The tubercle bacilli form colonies in the cutaneous vessels where they act as an irritant.

(2) The secreted or excreted tuberculous toxins contribute to the necrosis of the cutaneous vessels.

(3) The serum extravasated into the dependent portions, either by pressure exerted on some vein or lymphatic vessel, or when this is directly due to nephritis produces in turn a pressure on the cutaneous vessels which may act as a mechanical factor.

(4) In the later stages of pulmonary tuberculosis the viscera may undergo either hyaline amyloid or fatty degeneration, which aids in disintegrating the endothelial cells of the blood vessels producing necrosis of the endothelium and rupture. The fibrinogen-forming cells in the liver are also destroyed by

the morbid process thereby producing diminution in the viscosity of the blood and also delaying its coagulation

Herbert French maintains that general tuberculosis is not a common cause of purpura and yet in a few instances extensive purpura has been the first and for the time being the only symptom of an obscure illness which has ultimately turned out to be a general tuberculosis. The patient has generally been a child and diagnosis has only been possible when the course of the case has been watched

Brown says that purpura hemorrhagica rarely occurs in tuberculosis. In the last 1000 cases at the Adirondack Cottage Sanitarium but 3 cases have occurred. This corresponds to Cruces report that out of 1626 ward patients at the Phipps Institute he was able to find only 8 cases of purpura. Mac kenzie in 200 cases of purpura found it associated with tuberculosis only four times. Pratt in 258 cases of purpura both primary and secondary found it associated with tuberculosis seven times

Lavellee says that tuberculosis is found in many purpuric patients and often in their family history. In one of his cases a brother of the patient had died of tuberculosis at the age of fifteen. In a second case the mother was tubercular and in still another case the father of the patient died of tuberculosis. The patients themselves sometimes have tubercular lesions such as lupus of the face Pott's disease and vertebral tuberculosis

Burt reports a case of purpura hemorrhagica or morbus maculosus of Werlhof in a boy of eleven who one year previously had been operated for tubercular glands of the neck. Two maternal uncles had died of tuberculosis

Baudet states that while many authors think tuberculosis is not the cause of rheumatoid purpura it is at least the soil on which it develops. Tuberculosis is found in many patients with purpura or in their antecedents. In his case while the patient *did not show any active signs of tuberculosis* both his father and brother had died of it

Out of 35 cases of chronic purpura hemorrhagica reported by

Bensaude and Rivet, 7 occurred in individuals undoubtedly tuberculous. These authors say that in the presence of purpura, particularly in the recurring or chronic form, when the cause is not apparent, the clinician should by all means in his power look for some chronic tuberculous lesion, either of the lungs, glands, or some other part of the body.

The bowels and kidneys are not the only sources of bleeding in cases of purpura hemorrhagica. Blood is also frequently effused in the stomach, the intestines, the urinary passages, or the uterus, and occasionally in the bronchial tubes. Bleeding from the gums is a frequent associated symptom, together with hemorrhage from the bowels and the vomiting of blood. Emsheimer reports a case of hemorrhage from the urethra, and Fagge calls attention to the fact that epistaxis is the most frequent and usually the earliest hemorrhage from a mucous membrane. Lesegue reports a case in a girl of ten with profuse hemorrhages from nose, gums, throat, intestines and bladder. Lewis had a case of bleeding from the mouth.

**Sex**—The relation of sex to purpura hemorrhagica is still an open question. Fagge states that females are more subject to idiopathic purpura than males and this applies particularly to children. Burt also states that it is somewhat less frequent in the male than in the female. From the cases studied in connection with this review of the literature, it would appear that the disease is more common in males both in childhood and adult life. Of the 90 cases studied 61 occurred in males and 29 in females.

**Family History**—In the 90 cases studied only one instance of a family history of purpura is recorded. That was in a case reported by Burt. The disease occurred in a boy of eleven, two other children in whose family had recently had purpuric eruption on the lower extremities.

**Changes in Blood—Coagulation Time, Blood-platelet Counts.**—Minot, Hess, Steiger, Duke Lenoble, Nobecourt and Tixer, and Ledingham discuss platelet count and coagulation time. Minot calls attention to the fact that there was usually a delayed coagulation time, while Hess says that the coagulation

time of the plasma centrifuged for fifteen minutes is normal in purpura or but slightly prolonged. Steiger found a marked decrease in the coagulability of the blood.

In Minot's case the patient had an abnormally low platelet count, which he thought due to one or both of the following factors: (1) Some reaction, presumably a specific poison, taking place in the body which destroyed the platelets as fast as they were formed. (2) A localized aplasia of the platelet-forming elements of the marrow which might have been due to some toxic phenomenon. This destructive process perhaps toxic, anaphylactic, or of some other nature, seems to have been specific, because none of the other formed blood elements were involved. The anemia was easily explained by hemorrhage. There was no evidence of red cell destruction, as shown by the urobilin tests. The white cells were not affected.

The case was not one of aplastic anemia, i. e., generalized aplasia of the marrow, because there was no leukopenia, no marked lymphocytosis, and there was always a high percentage of reticulated red cells. In cases with aplasia of the bone marrow these cells are absent or very rare, and when increased probably signify activity of the red cell elements of the marrow.

The specificity of this reaction on the platelet simulates in every way animals injected with antiplatelet serum. In vitro the patient's serum caused no abnormal lysis or agglutination of normal platelets. Injections of patient's serum and blood into animals were negative.

There was usually a delayed coagulation time, a weak, non-retractile clot associated with a delayed prothrombin time, which did not vary directly with the platelet count or clinical symptoms. The antithrombin was normal. The platelets were actively thromboplastic, as were extracts from the uterus. Very slight delay of coagulation occurred with the syphilis coagulation test. The clotting of the plasma with thrombin as seen under the ultramicroscope, was normal.

The tourniquet sign was greatest when there were spontaneous purpuric lesions on the skin. The bleeding time varied with the platelet count, becoming longer as the platelets dimin-

ished. The bleeding time from the arm vein was shorter than from the ear, which was not due to a difference in the platelet count.

The essential treatment consisted of trying to replace the lacking platelets by eleven transfusions of normal blood and by giving locally and subcutaneously thromboplastic substances which contain one of the active principles of platelets. Transfusion resulted usually, but not always, in temporary improvement in the patient's condition associated with temporary rise in the platelet count. Thromboplastic substances were perhaps of benefit in temporarily controlling hemorrhage. In spite of the treatment the patient died thirteen months after the beginning of the illness.

Hess also states that typical purpura is characterized by marked *diminution* in the *number* of platelets. This may be due either to lack of formation of these cells or to their increased destruction.

Duke examined a series of 13 cases, and every case of pathologic hemorrhage observed which presented a certain clinical picture (purpura, bleeding from mucous membranes, a prolonged bleeding time, a normal coagulation time, and a firm blood-clot) had enormously reduced platelet counts. The tendency to hemorrhage vanished when the platelet count rose to a certain point and reappeared when the count fell.

He thinks purpura hemorrhagica is a symptom and not a disease. It has been observed complicating a varied set of diseases—in severe form in lymphocytic leukemia, hemorrhagic smallpox, tuberculosis, nephritis, benzol poisoning, aplastic anemia, and diphtheria. It is caused apparently by any agent which reduces the platelet count to a sufficient degree.

Lesourd and Pagniez believe that purpura is a blood disease, because the case they observed had a total disappearance of the blood platelets. They are however unable to say whether it is due to a blood infection, a toxemia of special type, or to some cytologic change.

Nobecourt and Tixer, after a study of 4 cases, conclude that blood examination, coagulation time and retraction of

clot do not furnish any basis for classification of varieties of purpura

**Pathogenesis and Experimentation**—Krumhaar and Musser have done some experimental work on rabbits and guinea pigs to show the changes produced in experimental purpura. Having noticed that in acute hemorrhagic dyscrasia (purpura hemorrhagica, severe anemia, etc.) when purpura is present a decrease in the resistance of the red cells to hypotonic salt solution frequently occurs, they were led to believe that there is a direct association between changes in the red cell resistance and the occurrence of purpura. Furthermore, as they have noticed the changes in the resistance only during the acute onset of purpura or while the purpura was developing and not during the subsidence of the symptoms, it occurred to them that the decreased resistance might be a factor in the pathogenesis of the purpuric lesion.

As a result of their experiments on rabbits and guinea pigs, they are inclined to believe that the hemolytic factor is a characteristic of the antiplatelet element of the serum and in part at least responsible for the production of purpura. If this is so, the suggestion naturally follows that the pathogenesis of purpura may be dependent on a substance which destroys the platelets and at the same time decreases the resistance of the erythrocytes and thus hastens their destruction. Through the decrease of platelets thus caused, would result a loss of thrombogenic substances and the characteristic prolongation of bleeding time, but the real basis of the pathogenesis of purpura would be the hemolytic substance which destroys the plates and weakens the red cells.

Hutinel brings out the point that in almost all purpuras there is hepatic glycosuria. Degeneration of the liver is the cause of the purpura appearing in old tubercular patients. It is known that patients with cirrhosis have a tendency to hemorrhage and that phosphorus and arsenic intoxication, which affect the liver cells, produce hemorrhagic symptoms. Purpura has been produced in animals by bringing about changes in the liver and nervous system.

Lippmann thinks that purpura is bacterial in origin though this has never been demonstrated. He thinks it is caused by some specific micro-organisms not yet isolated and that the virus circulating in the blood produces small emboli and hemorrhages which explains similar findings in typhus coliseptis and endocarditis maligna.

Burt says that the proximate cause of purpura hemorrhagica is believed to be a hyaline and amyloid degeneration of the walls both intima and adventitia of the blood vessels with ultimate hemorrhage and by rupture of the vessels rather than by diapedesis. It seems probable that any unusual pressure of the circulation against the vessels previously weakened by degenerative changes would be sufficient to precipitate the extravasation.

Cannata thinks the purpura is due to some organ having a mechanical influence on the circulation that is the suprarenal capsule. It is known that the suprarenal capsule produces a substance which has a stimulating action on the musculature of the heart and blood vessels and maintains the necessary tone of these organs. This substance—adrenalin—also has a neutralizing action on toxins circulating in the blood. Any disturbance in the normal secretion of these capsules brings about disequilibrium in the circulation and aggravates any toxic infectious process. He concludes that for the production of purpura it is necessary for the suprarenals to be affected by some infection of toxic infection. Di Giuseppe also believes in the relation of the suprarenal capsules to the production of purpura saying that he performed experiments in which he found that after the suprarenal capsules had been injured either mechanically or chemically when pathogenic germs of any sort were introduced into the circulation purpura was produced.

Tice says that the infectious etiology of purpura is evident from the arthritis the cutaneous manifestations the abdominal disturbances the leukocytosis and the occasional positive blood cultures.

Oslar says the cases have a dual etiology infectious and metabolic. Purpura with or without erythema and exudative le-

sions may follow gonorrhea otitis media parturition phimosis, and local lesions of the skin. The rheumatic poison is believed to be responsible for a large group. The bacteriologic examination of these cases is not very satisfactory, no unanimity has been reached as to the organism. On the other hand there is a large group in which the lesions are an expression of perverted metabolism. Chronic angioneurotic edema urticaria, and some forms of purpura are possibly anaphylactic phenomena in persons sensitized for certain protein substances. It is interesting to note that experimental sensitization may be transmitted.

The diverse localization the variable character of the exudate now serum alone now blood or blood and serum together are points that are not yet explained. The actual exudate is conditioned by the epithelial cells of the capillary walls damaged by a circulating poison as is so well shown in experiments with snake venom. But it may only be some such subtle change in the blood serum as takes place in the peripheral circulation in paroxysmal hemoglobinemia. Before long the anaphylactic key will unlock the mystery of these cases. The malignant purpura of the specific fevers and of the rare primary form may be anaphylactic phenomena.

Babes produced hemorrhagic infection in animals with bacteria isolated from the gums of scorbutus patients. He concludes from a series of autopsies in which he found putrid pharyngitis amygdalitis and bronchitis that morbus maculosus werlhofti is an infection.

Lee and Robertson produced typical purpura hemorrhagica experimentally by inoculating guinea pigs with antiplatelet serum subcutaneously intraperitoneally and directly into the heart. There were numerous and profuse hemorrhages a greatly delayed bleeding time a marked diminution in the number of platelets and a normal coagulation time, but no retraction of the clot. A histologic study of the different organs showing hemorrhagic areas gave no information as to the manner in which these lesions were produced.

It was thought that some light might be thrown on the mechanism by which the hemorrhages were produced in this con

dition by observing the local effect of antiplatelet serum on the small blood vessels of the mesentery. A guinea pig was etherized the abdomen opened and several loops of the intestine spread out on gauze moistened with warm salt solution. One c.c. of antiplatelet serum was dropped slowly into one of these loops. The only local effect observed during the hour that the test was carried on was a moderate congestion of the area to which the serum was applied. However at the end of forty five minutes several small hemorrhages were seen in two of the larger mesenteric glands and others could be produced at will by trauma. Soon petechiae were observed on the abdominal wall and intestine in areas quite distant from the point at which the antiplatelet serum had been applied. Some of these spots began to ooze. The bleeding time determined at this stage was twelve minutes. Death occurred shortly after this and autopsy revealed frequent infarcts in the lungs. The same result was obtained in another animal.

Thacher says that the number of platelets in the circulating blood may be experimentally reduced by injections of albumose. Moreover injections of serum from another species will produce a gathering of platelets into masses forming thrombi. Also sera destructive to platelets may be produced by the usual methods of experimental immunity.

Pratt in discussing the pathogenesis of purpura says that the blood vessels are certainly concerned in its production but the changes in them may be secondary to the changes in the blood. Probably a generalized vascular injury plays an essential part in the production of purpura but the nature of the changes in the vessels is unknown.

Fagge says that whatever the ultimate cause of purpura is it is probable that the immediate cause is rupture of a blood vessel from disease of its walls. It is probable that there is always actual rupture of the vessels not a diapedesis of red corpuscles.

Wesson reported a case in which he considered gonorrhea the etiologic factor as there had evidently been a very malignant gonococcal infection which had spread to the peritoneum.

and caused adhesions, with resultant coprostasis and auto-intoxication

Weil and McMeans report a case of bacteremia with purpura in which cultures of the *Bacillus lactis aërogenes* were obtained during life from the blood, urine, and prostatic secretion. The purpura, although a late manifestation, was the result of this infection. They concluded that the urethra was the point of entrance of the infection.

Romanelli describes a case of purpura hemorrhagica in a man of twenty six, in which he cultivated from the blood a streptococcus which produced hemorrhage when inoculated in animals.

Mackenzie says that it is certain that cutaneous hemorrhages are sometimes determined and in all probability primarily caused by nervous influences as in the cases of purpura occurring in conjunction with the lightning pains of tabes and in connection with certain neuralgias. The mechanism of the hemorrhages in such cases is purely conjectural, but it seems most probable that by acting on vasomotor centers it produces variations of vascular pressure under which the blood vessels give way at the points of least resistance.

Venous stagnation also plays a rôle in the production of purpura. Other factors are changes in the quality of the blood, such as decrease of red corpuscles, increase of white corpuscles, deficiency or excess of some of the saline constituents, alterations in the specific gravity, deficiency in fibrin-forming elements. Diminution of support to the vessels by the surrounding tissues may also be a factor. This occurs in those who have wasted much from disease in the loss of elasticity and vascular degeneration of the aged, and in the newborn. Albuminuria is of rather frequent occurrence in purpura. It occurs in both febrile and non febrile cases, and corresponds with the statement that in fatal cases the kidneys are frequently found diseased.

Narizzano, Elliott and Kaye, Roux, Stelwagon, Lenoble, Bauch, Coutts, Adams and Nichols, and Hanns have also discussed the pathogenesis of purpura.

**Autopsy Findings**—In a few of the cases reported post-

mortem examinations were made and the findings are quite interesting

Osler saw the kidneys of a typical case in the service of Dr W T Watson, in which death occurred with dropsy at the end of the sixth week from the outbreak of purpura. There was no endocarditis, the spleen was greatly enlarged, *the kidneys were enormous each measuring 12 x 7 cm*. The cortices were pale, the striations distinct, and the glomeruli stood out as translucent nodules like milary tubercles. There were a few small hemorrhages. In addition to the extensive degeneration of the epithelium the tubules were filled with desquamated cells, hyaline casts and red blood-corpuscles. The glomeruli showed remarkable changes. Every tuft was much compressed within by a new growth of the capsular sheath forming a crescentic mass. Dr McCallum says that this is a type described as *adhesive glomerulonephritis*, in which with great proliferation of the epithelium, there is also a new growth of connective tissue within the capsules.

Roux describes a case reported by Moussous in 1891. The case was that of a child of thirteen with rheumatoid purpura and hematuria followed by albuminuria and death from uremia. On autopsy the kidney capsule stripped easily, macroscopic appearance was that of a large white kidney, though the enlargement was not very great. Histologic examination showed the changes of a diffuse nephritis involving all the tissues of the organ: glomeruli, connective tissue, tubules. Some of the glomeruli showed marked fibroid degeneration with fusion of the vascular loops, the capsule was considerably thickened and infiltrated with cells. There was a very marked periglomerulitis with abundant cells around the vessels and in the intertubular spaces. The convoluted tubules, many of which were dilated, contained numerous hyaline casts. Their epithelium was broken down, the cells swollen and very granular, epithelial debris filled the lumen of the tubules. In preparations treated with osmic acid fatty degeneration of the epithelium could be seen. Henle's loops and the straight tubules were much less changed, but some of them were filled with red cells. At other

places there were small interstitial hemorrhages. No signs of amyloid degeneration were found.

In the few autopsies that have been reported the changes were generally those characteristic of the large white kidney. All the elements of the kidney have been involved; that is, there was diffuse parenchymatous nephritis. The macroscopic appearance has shown only enlargement or sometimes small hemorrhagic spots on the surface.

Lewis reports a case of Werlhof's disease in a laborer aged twenty-nine, which began with bleeding from nose and mouth and then the appearance of purple spots. The urine was filled with red blood-corpuscles and contained 40 per cent of albumin in volume. He died one week after admission. Autopsy showed heart muscle intensely anemic; ventricle moderately dilated with few hemorrhages in subendocardial tissue, valves normal. Spleen was dark colored in spots and twice normal size, kidney capsule not adherent intensely anemic with extensive hemorrhages around the pelvis. Stomach showed extensive hemorrhages in mucous membranes, mucous membrane of upper duodenum pigmented. Suprarenal capsule fatty. Numerous hemorrhages over anterior peritoneum and a large retroperitoneal hemorrhage covered the entire posterior surface of the body. Liver and pancreas intensely anemic. Intestines. Mucous membrane blood stained otherwise normal. Culture of blood from heart showed *Staphylococcus pyogenes albus*.

Mackenzie says that on postmortem examination the most important changes aside from hemorrhages are in the kidneys and lungs. Slight degrees of diffuse or parenchymatous nephritis are relatively common. Congestion and edema of the lungs are frequently present and are often the cause of death.

Cannata describes a case of purpura hemorrhagica in an infant of eighteen months in which autopsy showed tuberculosis of various organs but nothing noteworthy in the kidney. The suprarenal capsules showed a vacuolization of the cells in the cortical zone. In the medullary zone were foci of punctate hemorrhages. The cells in this zone were granular, the nuclei pale, the protoplasm vacuolized and granular.

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Osler saw the kidneys of a typical case in the service of Dr W T Watson, in which death occurred with dropsy at the end of the sixth week from the outbreak of purpura. There was no endocarditis, the spleen was greatly enlarged, *the kidneys were enormous, each measuring 12 x 7 cm*. The cortices were pale, the striations distinct, and the glomeruli stood out as translucent nodules like milary tubercles. There were a few small hemorrhages. In addition to the extensive degeneration of the epithelium the tubules were filled with desquamated cells, hyaline casts and red blood-corpuscles. The glomeruli showed remarkable changes. Every tuft was much compressed within by a new growth of the capsular sheath, forming a crescentic mass. Dr McCallum says that this is a type described as *adhesive glomerulonephritis*, in which, with great proliferation of the epithelium, there is also a new growth of connective tissue within the capsules.

Roux describes a case reported by Moussous in 1891. The case was that of a child of thirteen with rheumatoid purpura and hematuria, followed by albuminuria and death from uremia. On autopsy the kidney capsule stripped easily, macroscopic appearance was that of a large white kidney, though the enlargement was not very great. Histologic examination showed the changes of a diffuse nephritis, involving all the tissues of the organ, glomeruli, connective tissue tubules. Some of the glomeruli showed marked fibroid degeneration with fusion of the vascular loops. The capsule was considerably thickened and infiltrated with cells. There was a very marked periglomerulitis, with abundant cells around the vessels and in the intertubular spaces. The convoluted tubules many of which were dilated contained numerous hyaline casts. Their epithelium was broken down, the cells swollen and very granular, epithelial debris filled the lumen of the tubules. In preparations treated with osmic acid fatty degeneration of the epithelium could be seen. Henle's loops and the straight tubules were much less changed, but some of them were filled with red cells. At other

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In the case reported by Weil and McMeans postmortem examination showed the bladder small walls somewhat thick, and the mucous membrane everywhere dotted with bright red hemorrhages the majority of pinhead size. On the surface of the kidneys were many small gray areas about the size of a pin head. In the left kidney was one larger yellow area surrounded by a hemorrhagic zone, cortex and medulla not well defined.

Fagge and Pye-Smith report the autopsy findings in the case of a man dying suddenly of apoplexy after a week's illness of purpura. There were extensive ecchymoses over the whole body and in the mucous membrane, particularly in the mouth, esophagus, stomach and bladder. Of the solid viscera the kidney alone was hemorrhagic, but blood was effused under the pericardium.

In Bimet's case petechial hemorrhages of stomach and intestines were found but the kidneys were normal.

Hutinel's case showed large white kidneys, typical of chronic parenchymatous epithelial nephritis.

Jacobson reports the autopsy findings in a case published by Henoch in 1874. The case was one of purpura with albuminuria, and death followed from peritonitis. At autopsy, numerous superficial ulcerations of the intestinal mucous membrane, covered with croupous and diphtheric exudate, were found.

In Sutherland's case of intussusception and purpura in a girl of seven autopsy showed the intussusception the cecum and part of the ileum being invaginated into the colon for about 4 inches. The peritoneum was covered with pus.

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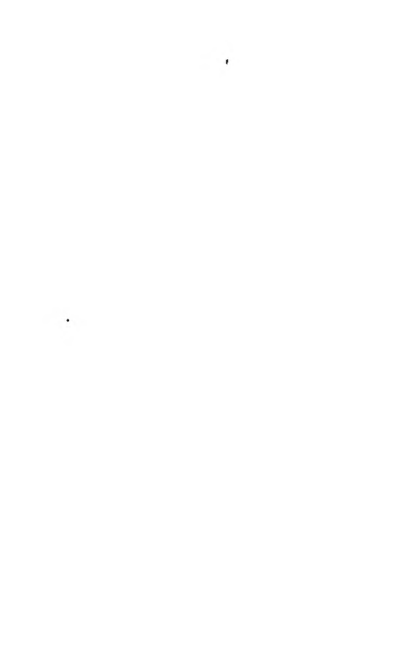
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## CLINIC OF DR. CARL BECK

### NORTH CHICAGO HOSPITAL

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#### RECONSTRUCTION OF EARS AND NOSE

- 5     *or*     A patient presenting marked congenital deformities of the face and ear     corrected by repeated plastic operations     end results

AMONG the more frequent ear reconstructions of peace times are those made necessary by congenital defects. Abnormalities of the ear are relatively common and we find all degrees from total absence to the presence of some slight deformity of an otherwise perfect ear.

The following case is illustrative of one of the extensive types of physical defects of ears, nose and face which come under the observation of the plastic surgeon.

E. McN. was referred to me by his physician for plastic reconstruction of ears and nose. His external appearance was such that he would create curiosity with every observer as there was a perfect contrast between age and appearance. His age is sixteen, his face looked like that of an old man, his nose was exceedingly large with its tip hanging over the upper lip. His ears were malformed; there were two irregular flaps of skin which indicated where the ears should have been. He covered these defects with his hair which he combed over his ears. No external meatus nor any indication where the meatus should be was present. There were a few cartilaginous nodules irregularly distributed around and in that small lobe of skin which indicated the remnant of the ear. The hearing was somewhat defective but evidently the inner ear was normal inasmuch as the boy heard fairly well when talked to in a loud voice and understood but his speech itself was defective and only after a time did we become accustomed to the same and

understand it although it was absolutely non understandable at first (Both of these conditions have as we will state later improved in course of treatment)

His malar bones were defective. On the right side there was still an indication of a malar bone. On the left side it was totally absent. There was a depression instead of a prominence in the region of the malar bone. The eyes on account of this



FIG. 449.—Front view of the patient A, he appeared before treatment. Notice the broad crooked nose the lant of the eyes and the two nodules for ears which appear in this front view almost like normal ears in the picture but which represent all there is present of an ear the hair being carefully combed across, so as to hide the defect as much as possible

deformity had a peculiar slant with the external corner much lower than the internal quite the opposite of the condition which we see in the Mongolian race. His mouth was deformed in the manner which is so characteristic of the prognathic type of skull namely the upper jaw projected considerably the roof of the mouth was high and the arch narrow the front of the upper jaw projecting over the lower which receded conspicuously

This whole complex of deformities gave to this boy an ex

tremely disagreeable appearance and made this otherwise bright and very pleasant boy a nuisance in his home town. Besides all this he had a septum which occluded the left nostril and allowed hardly any air to pass and consequently his lacrymal duct on that side was obstructed and the seat of a chronic suppurative dacryocystitis (Figs 449 and 450)



Fig 450 Side view showing the shape of the nose with septum enhancing the upper lip the projecting upper jaw and the receding lower jaw. The defect of the malar bone in this case is visible as there is a depression below the eye and the outer angle of the eye is everted slightly. The ear in this side view shows exactly the small lobule present with a good shape of the crume something that the other side did not show.

It was rather difficult at first to form a plan as to the procedure of plastic operation as there were so many problems involved in this complicated case. The following indications were present:

- (1) An improvement in the appearance of the external nose (cosmetic)
- (2) Removal of the obstruction of the nasal passages (functional)
- (3) Cure of the dacryocystitis (functional)

(4) Plastic reconstruction of the malar portion if possible so as to raise the external canthus of the eye (functional and cosmetic)

(5) Reconstruction of the meatus and formation of a canal if possible (functional)

(6) Reconstruction of both external ears (cosmetic)

The operative procedure decided upon was to begin with the nose, remove the obstacle to breathing by a submucous resection of the septum and improve the shape of the nose by using the abundant tissue at the tip to make a new septum thus diminishing the size of the nose at the same time while the nostrils were freed and their openings directed toward the outside instead of downward toward the lips.

Under general anesthesia this operation was performed in the following manner. The septum was cut across in its soft parts transversely, about  $\frac{1}{4}$  inch from its insertion into the upper lip and then with a pair of scissors the inner cartilaginous septum was cut into such shape as the nose should have afterward. A triangular piece of cartilage was removed in this manner. The tip of the nose appeared now as an elongated strip of quite hard resistant tissue like the snout of an animal. A portion of it was removed at the tip and the balance folded over and fitted into a new septum so that the nose was at once shortened and made more shapeless (Fig 451). This however was impossible without removing at the same time a portion of both wings of the nose at the anterior angle of the septum. Otherwise the nostrils would be transverse small slits. These portions of the nostrils were removed by cutting out two angular pieces one on each side and cartilage was removed to such an extent as to shape the wing of the nose properly. No raw surfaces were left but everything was sutured into its place and the nostrils both packed sufficiently to prevent an abnormal healing in the anterior corners of the nostrils. After a few days this packing and the stitches were removed.

An important point to be mentioned at this time is that the stitches should not be left too long in these reconstructive pro-

cedures, inasmuch as they easily cut through and produce scars which are unsightly if left too long

At the same sitting, in the same operation, the right ear was attacked in the following manner The little nodule



FIG. 451.—1 Incision and flap formation in tip and wings of the nose—*a* is the portion sacrificed *b* the portion which formed the new tip. 2 Operation completed.

of soft tissue on the right side which was overlapping the place where the meatus ought to have been, and which contained a few irregular lumps of cartilage, was dissected

anteriorly from the site of the supposed meatus. By cutting this tissue in such manner as to unfold it and give it the shape of an ear, which however was very small we obtained a defect about 2 inches in the longitudinal and about 1 inch in the horizontal direction. The border of the concha of the ear had not a very nice curved shape as a normal ear ought to have but was rather too thick in its upper portion, and there was



Fig. 4. — Appearance after the first operation showing the results of the newly made septum, the removal of the point of the nose, and the implantation of fat in the malar region. It shows also the operation on the ear, the irregularly shaped new concha, and the rather succulent thick flap turned upward from the neck. The eyes appear in this figure much less slanting on account of the plastic, especially the left eye.

hardly any indication of a lobule. We looked in vain by dissecting into the depth for the remnant of an ear canal. At one time we thought we had a canal or a cavity lined with ciliated epithelium but we soon found that it was the artificial product of our operation and we had to conclude finally after going deep enough that there was no external auditory canal present.

The all important matter was now to give the ear the shape

of an external concha, and not allow that lobule when it healed to again project forward. We knew it would have the tendency to do so more especially since those few cartilaginous nodules were binding it tightly toward the face side and offered resistance to unfolding the ear backward into its new position. We



FIG. 453.—Side view which shows the shape of the nose—at this time greatly improved but still rather bulky on account of the swelling of the tissues forming the nostril. The ear shows already the shape of the concha but some irregularity. One can see that the cartilage thus forming the base of the upper portion of the concha has this tendency to draw the ear forward again. The scar of the flap which forms the anterior portion and the future lobule is seen running along side the chin.

therefore cut these cartilages in such manner as to arrange them in a half moon into the border of the lobule and sutured the skin cartilage flap back to the region of the mastoid with a couple of skin to skin sutures which we ordinarily use in order to retain the position of structures in plastic work. These sutures are placed through the intact skin and have no other

purpose except to fasten portions of skin together in immobilization. This method I use frequently instead of any other immobilization but the sutures must not be allowed to eat through.



Fig. 4-4 Several weeks after the ears are showing considerable size. They have both been operated on and re-operated and the right ear already shows a lobule but the shape of the ear is still not very natural although the size is normal. The left ear is much better than the right one having had a little more material to work on and having had a normal lobule. The outer border of the concha was here more arch shaped and although the size of the whole external ear was smaller than it ought to be its shape was more like the normal. A good deal of contraction has taken place in the nose and one can see how pointed the tip is now the swelling of the tip having given way to retraction. Notice also the retraction over the malar bone around the cartilaginous implants.

In this way we had a half way decent looking ear of small size, without any lobule and without any depth offering a defect of 2 by 1 inch. To cover this defect and to obtain some material for a later lobule operation we decided to use a flap from the skin of the neck to cover the anterior defect. A

pedicled flap of approximately the same size alongside of the jaw and below it was cut out left with its upper portion as a pedicle in contact with its matrix and turned upward in the defect and sutured into the same forming a broad anterior skin cover of the new ear (Figs 453 and 454)

This completed the first operation. The patient recovered nicely from his operation and a picture taken a short time afterward shows the remarkable improvement of his features. He was presented in this condition before the Chicago Surgical Society at one of its meetings.

From now on we had a large number of corrective operations on this patient all of them were done under local anesthesia which proved very satisfactory. To improve the shape of both ears and to ultimately get a cosmetic result since a perfect functional result is not possible on account of the absence of anatomic structures like the auditory canals we had to go very slowly and act only after having watched the result from step to step for some time. The results of these operations often looked fascinating and beautiful shortly after the operation tissues were succulent and imitated the shape of organs just in the manner we wanted them to but after a few weeks cicatricial contraction destroyed their shape and form thinned them out and we found that the result of our operative work had been greatly overrated. A successful terminal result requires therefore a great deal of patience and a good deal of ingenuity and also a good deal of experimenting inasmuch as individual differences also play some rôle in these operations. What may be a good method in one case might not prove as good in another patient. As a rule it is better to take more tissue for plastic work than too little because we find in the ultimate healing a great deal of shriveling up of transplanted tissues takes place.

The steps gradually taken in this case can be best described as follows. We very soon saw that the nose was contracted too much in the apex. The tip had become too sharp pointed at that place at which we cut off the septum (Fig. 455). We were therefore required to introduce some cartilages into the

side of this apex, so as to make a broader tip to the nose. This was done by using cartilages from other patients obtained from submucous resections which is excellent material cut into the required shape and slipped under the skin by making a small incision near the point of the nose tunneling under the skin



Fig. 43—The ear in its original form. One would be inclined to think from this figure that there was a great deal of material present and that all that was needed was to dissect that ear from the front where it was so to speak adherent deflect it outward and one would have a normal ear. Only the lobule is normal as one can see and that very poorly shaped. The rest of the ear has a very small amount of tissue the whole area if deflected not much larger than the lobule itself but there is a sharply defined cartilage of a rudimentary ear which is more of a hard hip than a help in the plastic having a tendency to bring the ear constantly into this shape and make it difficult to roll it out.

and slipping the cartilage into place and suturing with fine horse-hair the opening through which it had been introduced. Two such pieces were introduced into the tip of the nose. The result was satisfactory at first but we had to repeat this maneuver before we obtained the final result as we cut the carti-

lages too small at first and found that between the implanted cartilages there remained depressions of the retracted skin

A second procedure in the nose was necessary several times, through the constant tendency of the nostrils to diminish in size. If we kept them packed with gauze or with especially devised dilators we found that they were in excellent condi-



Fig. 426—These pictures show the left ear after it has been deflected from its original adhesion and before the ridge of new tissue is implanted. The meatus

tion but on leaving these dilators or packings off the nostrils gradually contracted especially the left one and ultimately we had to make a small correction under local anesthesia sliding a small flap from the septum into the anterior corner of the nostril so as to prevent the formation of a scar at this point

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Fig. 436.—These pictures show the left ear after it has been deflected from its original adhesion and before the ridge of new tissue is implanted. The meatus, however, and the depression of the ear has been formed by the plastic of a flap cut from behind the ear and drawn through the slit of the perforated concha. One can see the indication of the anterior fold of the concha formed from the skin in front. It needs in this case an outer flap on this defective ear in the shape of a comb as Fig. 435 shows during the operation.

tion but on leaving these dilators or packings off the nostrils gradually contracted especially the left one and ultimately we had to make a small correction under local anesthesia sliding a small flap from the septum into the anterior corner of the nostril so as to prevent the formation of a scar at this point.

The right ear was the greatest difficulty for us because it had originally not the slightest resemblance to an ear. On the left side we had an easier task (Fig. 456). There was a very nice lobule present which required no further correction and it was only necessary to enlarge the ear by putting a crown upon



Fig. 457—The condition after the flap has been formed with the pedicle directed upward and its free end directed downward behind the ear. This flap as one can see is turned and fastened into the hole surface made by separation of the outer border of the rudimentary concha and sutured exactly in front and in the back. It is of considerable size as it will shrink in course of time and this must be taken into consideration. It is left in contact with its mother tissue until it adheres in its new position and then the pedicle is cut and sutured exactly into its new location.

the concha which we gained by using a flap from behind the ear and inserting it on the top of the flap gained from the original defective ear (Fig. 456 a and b). This comblike attachment of the new flap meets beautifully the external outline of a normal ear. It has some hair growing on it which is the only drawback but otherwise it is perfectly satisfactory.

In order to give depth to the concha which is the real beauty of an ear, we decided to use the method of the flap from behind the ear (Fig 457) which we pulled through the substance of the ear by cutting a slit through the whole ear longitudinally and drawing the flap through the slit attached to its former site by its pedicle. This maneuver made a beautiful depression in the center which remained afterward when we cut the pedicle through and inserted it on the opposite side in the inside of the ear. By packing it with gauze or cotton daily we could keep it in its depression and we could also force it to adhere slightly to the posterior surface of the ear a maneuver which kept the whole ear in a normal position instead of giving it its tendency to flap forward like a dog's ear. This was best accomplished by using adhesive plaster without any other dressing over the ear.

The most difficult task remained to give the ear a certain amount of stiffness which could be produced only by introducing cartilage into the same since there was very little or none present. We gained this cartilage partly from the patient and partly from other people using only small pieces at a time, being afraid that if we used a large piece we might have sloughing and small pieces being introduced much easier through small incisions in different places and by tunneling into the desired place. In this manner we gradually introduced enough cartilage to build up a cartilaginous ear on the inside. The same process was followed also on the right side where there was however more difficulty because some cartilage was present there which had a tendency always to push the ear into its former defective position. On the right side we had also a difficult task in forming a lobule but ultimately it was possible and was accomplished in a fairly good manner (Figs 458 and 459).

There remained only one step for plastic which was greatly desired by the patient that is the building up of his cheeks in the region of the malar bone which was missing. We also

tunneling bluntly through the region where we wanted to implant, and introducing these transplants in the desired manner. The fat was taken from the buttocks and from the anterior thigh, the cartilage from other patients.

We could build up this region considerably, but there always remained a noticeable depression inasmuch as the tissues in the course of months contracted to a considerable degree.



Fig. 458—Appearance of the patient shortly before his discharge for home. On the right side the ear required several additional small operations in order to improve its shape. It is of normal size and the concha has a much more normal appearance. There is a tragus and antitragus, but little portions of cartilage will have to be inserted to make the ear more natural, which was done before the patient left. Also the lobule has been slightly improved. The nose is of very good appearance from this side; the right wing has a good shape.

When the patient left after several months' treatment we found him greatly improved in appearance, although it was im-

that the hearing was better and his speech improved considerably on account of the better hearing. In the beginning no

one could understand the boy unless he paid very particular attention, and had him repeat a sentence two or three times, but at a later date even strangers could keep up a conversation with him. His mental improvement was the best of all. When he arrived he was shy and conscious of his looks and deformity, trying to evade the public eye and even the company of any one in the house. He began to get very chummy with other pa-



Fig. 459 — This view from the other side shows the condition of the left ear and the appearance of the nose from the left side of the face. One can see the nose almost of normal shape, the point built up by the introduction of several small cartilages; the eye raised; the malar portion also raised by the introduction of several portions of fat lobules and cartilage; the ear almost of normal shape and configuration. The white spot is cotton, which fills the new right meatus.

tients played cards and games, and visited shows, and at last began to take great interest in aeronautics, expressing the wish to become an aviator, because he had read that defective hearing in a certain degree was favorable for people flying in the air, and he used to discuss these matters at some length with the physicians and nurses, showing that his mentality had also improved with the reconstruction of his face.



## CLINIC OF DR LEWIS L. McARTHUR

### ST. LUKE'S HOSPITAL

#### FIBROMYOMA OF STOMACH SIMULATING STOMACH ULCER

*Summary* Patient presenting characteristic history of stomach ulcer and repeated attacks of jaundice—severe gastric hemorrhage followed by epigastric pain—x-ray diagnosis—operation—pedunculated fibromyoma of stomach found and removed—after history

Of the 3 cases I am about to operate upon this morning, this one presents a most characteristic history of stomach ulcer. The patient has been under observation for some months preceding her entrance to the hospital on June 3, 1918. Her family physician concluded her to be suffering from chronic stomach ulcer and tried the usual remedial agents. Her family and past history are negative. She had never been seriously sick until the onset of the present trouble, which is, on the whole, of two years' duration. During the past two years she has complained of headache, nausea and vomiting, which are often preceded by a chill. She has been constipated and has had repeated attacks of a mild jaundice. For the past three months she has lacked appetite and had no desire for food. She has not had eructations of gas. During the past two weeks in the hospital she has had epigastric pain coming on after meals and lasting from one half to two hours, she was in fact brought to the hospital during a severe hemorrhage, in which she bled to exhaustion and exsanguination. For three days preceding the hemorrhage she had been nauseated. She has frequently passed black tarry stools, and for these three days had passed large, copious ones of this type. The vomiting of blood had not been noticed prior to this time of admission.

The hemorrhage being checked, a blood examination, made



Fig 460—Pedunculated fibromyoma of stomach with crater ulcer of its apex producing typical clinical symptoms of bleeding pyloric ulcer with stenosis.

seven days after this hemorrhage, showed reds, 4 260,000, leukocytes, 7000, hemoglobin, 54 per cent

Three months prior to admission x ray investigation was made of the stomach and it was shown to be practically normal in size. The pylorus did not fill out well. The bulb was perfectly normal. Peristaltic action was increased. The emptying time however was very much prolonged one half of the bismuth meal being present at the end of eight hours. The colon showed no abnormality. The radiographer returned the diagnosis of an ulcer with prolonged retention of the gastric contents.

We have then here a case as positively characteristic of pyloric ulcer as one can hope to find. The vomiting of blood and the passage of tarry stools confirms the lesion and the hemorrhage having been so severe as to jeopardize life operative interference rather than medication is imperative.

**Operation**—June 7 1918. Because of her anemic condition we shall use a gas oxygen anesthesia. I have made the usual midline incision and because of the reported frequent though painless jaundice attacks will first examine the gall bladder and bile tracts. The gall bladder appears normal in every respect. Nothing is to be palpated in the common duct the cystic duct nor is there induration of the head of the pancreas. The pylorus and duodenum are both normal! No evidence of cicatrices visible.

With so frank a history of ulcer and the conviction so strong of its existence I shall make a more careful search along the lesser curvature and posterior wall of the stomach. In making this search I believe I have found the cause of her trouble. I have found a movable mass the size of a large English walnut just proximal to the pylorus and apparently attached to the posterior wall of the stomach near the lesser curvature. I am chagrined at the error in diagnosis but will apply stomach clamps to the stomach on either side of the tumor clamping them sufficiently tight to control hemorrhage and escape of contents. Between them I shall make an incision through the anterior wall of the stomach in order to expose the pedunculated tumor. On doing this it is possible to make the tumor appear through the anterior incision and grossly it gives the appearance of a pedunculated



Fig 461

fibroid covered with mucous membrane, but, strangely enough, showing an ulcer of crater character on its free end

In order to remove this growth I shall make a cuff of mucous membrane near its attachment to the posterior wall of the stomach, and if necessary resect the muscular wall there also, in fact, this cuff of mucous membrane, stripped back from the tumor, enables us to enucleate the tumor completely without



Fig 462—Microscopic section of fibromyoma

further disturbance of the posterior wall than the incision in its mucous membrane. This we close with a simple, continuous catgut. The closure of the anterior wound is made in the usual manner, but it is of no special interest. But of intense interest is the fact that in this case a pedunculated tumor so situated

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Fig 461—Illustrating steps in removal of tumor. 1 Incision in anterior stomach wall between clamps. 2 Delivery of tumor through incision. 3 Flaps of mucosa reflected from pedicle and discovery that posterior wall is not involved in growth. 4 Closure of posterior wall mucosa.

in relation to the pylorus that with the peristaltic waves it completely occludes the same like an obdurator, and provokes both pain nausea, and retention without observable deformity. The ulcer situated on its free apex may be so constricted by the pylorus muscle as to make a prolonged hemorrhage, thus explaining the tarry stools the great faintness and probably explaining the jaundice rather as a urobilin jaundice (from the decomposition of blood in the intestines) than a bile jaundice incident to common duct obstruction.

*Further History*.—Patient made an uneventful recovery. Stitches removed on the tenth day, up and about on the twelfth day, left hospital on the thirteenth day after operation, and now reports herself free from digestive disturbances.

*Microscopic examination* of the tumor reveals it to be a fibromyoma. Examination of the ulcerated area reveals no carcinomatous degeneration of the ulcer surface.

My colleague, Dr. Arthur Dean Bevan, has had a similar case in so far as the tumor and location of ulcer is concerned, but in his case the tumor was carcinomatous.

# CLINIC OF DR. CHARLES MORGAN McKENNA

## St. JOSEPH's HOSPITAL

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### PRESENTATION OF THREE GENITO-URINARY CASES

*Summary* CASE I—Demonstration of a case of ureteral calculus previously operated

CASE II—Varicocele—method of operation—after-care

CASE III—Stone in bladder complicated by a colon bacillus infection, history of case technic of removal—advantages of a suprapubic cystotomy over a stone-crushing operation treatment of bladder infections, closure of wound—necessity for careful closure in bladder operations

#### CASE I—URETERAL STONE—SUBSEQUENT HISTORY

SOME weeks ago we operated in this clinic a man with a stone in the lower portion of the ureter<sup>1</sup> I think some of you will remember this case It was a very large conical shaped stone, the removal of which was followed by the discharge of a considerable amount of pus I think there was some argument among the students that morning regarding the question of the kidney on the corresponding side, as to whether it would functionate or not I have brought that patient in this morning to demonstrate the case to you with the cystoscope and to let you see that urine is coming from that side

We will now fill the bladder You notice that the bladder contains the normal amount of fluid On examining the ureter on that side you will see that urine is coming from it The bladder shows the scar where the incision was made The urine is coming naturally I might mention here that I have already done a functional test on this man and found the kidney function normal The patient also reports that this is the first time in his life, or at least in the last eighteen years, that he has been entirely free from pain It just shows you how a patient will

<sup>1</sup> This case was reported in the Surgical Clinics of Chicago October 1918

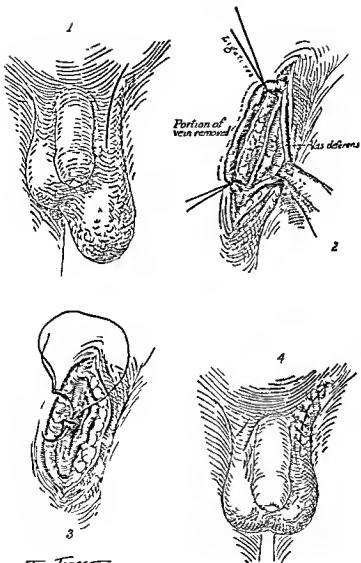


Fig 463

continue to go from day to day with an impacted foreign body and yet persevere with it. I can only say that it is as much satisfaction to me, I believe, as it is to the patient to have him entirely well. I would like to have each man look in the bladder and compare the condition with that found on the morning we did the operation.

## CASE II—VARICOCELE OPERATION

This young man is twenty seven years of age. He has been suffering for some time with a varicocele on the left side, which is the usual location. As he has decided to go into military service and wants to report as soon as possible, he has asked me to do this operation so that he may be out of here in a very short time.

I believe that the best way to get a perfect result and cause the patient as little inconvenience as possible is to make the incision at the junction of the scrotum to the body. We cut down, you notice, to the cord (Fig 463, 1). There is very little bleeding. We pick up the cord, and immediately separate the vas from the rest of the contents of the cord (Fig 463 2). This is done, as you see, in a very simple manner, by rolling the cord over the fingers. We find the vas very hard and it feels very much like a large piano wire. I will just pick it up and show it to you. You see it tallies very well with the description given in most text books. It is white in appearance and very firm in consistency. We will put this over to one side by putting a sponge around it. I now pick up the vein. You notice that we do not go down into the scrotum and try to ligate a portion of the pampiniform plexus but will just take out a section above. You can also notice that the testis on this side hangs very much lower than it does on the other side and that

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Fig 463—1 The line of incision. 2 The vas deferens is being held aside by means of a strip of gauze after having been isolated from the cord. The vein has been ligated above and below. 3 The vas deferens and artery have been returned to their normal location. The ligated ends of the vein are being sutured together. *Note that this shortens the cord approximately 2 inches thus raising the lowered testicle on that side.* 4 Incision closed. Note normal appearance of scrotum.

it is very much smaller on this side. By taking out a section of the vein, as we are doing here, and bringing the lower portion up, we not only cure the man of the varicocele, but we also do a suspension of the testis on that side (Fig 463, 3). It is interesting to know that this class of cases is relieved greatly after operation, and many times where the patient is young the testis on that side will regain its normal size. This, of course is due to nourishment alone. I believe this operation should be advocated where this condition exists. This man will suffer scarcely any pain afterward.

We will close the wound by putting two catgut sutures through the covering of the cord and close the skin with interrupted horsehair sutures (Fig 463, 4). I am using horsehair this year exclusively, as it is almost impossible to get silkworm-gut.

It is most important that the after-care in this class of cases be followed out carefully. You notice we place on this patient a very tightly fitting T binder to hold the testis in the proper position. Immediately after this operation the collateral circulation is establishing itself and much damage can be done if the testis is allowed to hang without support. It will also cause a great deal of edema and swelling and as a result your patient will have a considerable amount of pain for the first few days after the operation, necessitating his remaining in the hospital for some time. I have seen cases of this kind in which a support was not used followed by infection which caused the patient's stay in the hospital to last from five to seven weeks. If we can only keep in mind that the little things in the after treatment will do more than a few of the big things that we speak so much about, I believe it would be better for the patient, hospital, and ourselves.

#### CASE III.—STONE IN BLADDER COMPLICATED BY A COLON BACILLUS INFECTION

Mr. C., thirty two years of age, was referred to me by Dr. A. A. Hayden. This man gives a history of a Neisserian infection about four years ago, and he believes that his entire trouble

dates from that time. He complains of a great deal of pain in the bladder region and excruciating pain during urination. He has very frequent urinations, getting up as often as six to eight times at night. He says that many nights before he can go to sleep it is necessary for him to stand practically on his head, with the feet and legs up beside the wall. By so doing the pain is relieved. He gives a history of having passed a stone with some blood. That in itself would be sufficient evidence on which to base a diagnosis.

This patient has been cystoscoped, and a very much inflamed bladder containing a great deal of pus was found. A mass can be seen, which we believe is a stone. After the cystoscopic examination we passed a stone-searcher and could easily feel the stone. You know it is possible to overlook stones in the bladder, especially in this type of case, where there is so much blood and pus present that the media is almost red, which makes the view nearly impossible. We spent some time irrigating this man's bladder before attempting the cystoscopy. I might say that we irrigated the bladder as many as twelve to fifteen times before anything like clear fluid was returned. We made cultures of the pus, and found that it was nearly a pure colon bacillus infection. He also complains of some pain over the left kidney, which, of course, may be the result of a colon infection on that side. We did not attempt to catheterize the ureters at this time, as his primary trouble is a stone with infection, and I believe after removal of the stone and proper irrigation through the suprapubic opening the infection will be relieved.

This patient, you observe, has been prepared in the usual manner, just as for a suprapubic prostatectomy or any suprapubic opening into the bladder. We will do this operation under local anesthesia, using  $\frac{1}{2}$  per cent novocain. You notice that we do a nerve-blocking operation. First we use a very fine hypodermic needle attached to a very large syringe. After a few superficial injections we change to a larger needle, which is about 3 inches long. After the needle is pushed through the skin, it is very easy to anesthetize the different tissues from the same position without traumatizing the skin or causing any

extra pain to the patient. Sometimes I think we do not give the patient enough consideration even with a local anesthetic. The patient, you must remember, is under the greatest tension and is really waiting to be hurt. You notice that I can take the edge of the knife or the needle and carry it in this way, and the patient has not the slightest sensation of pain.

Before filling the bladder I inject 4 drams of a 1 per cent. cocaine solution into the bladder to relieve the patient of any pain from the instillation of fluid. By so doing we are able to distend the bladder so that it will present itself well in the supra-pubic space. Now we will fill the bladder. It holds about 1 pint.

We are making a median incision, cutting down through Retzius' space and exposing the bladder. You notice that I am making a very small incision. It is not necessary to make a large incision for the removal of stones. We only want an incision large enough to remove the stone and introduce a drain. We must keep in mind the peritoneum, which is so closely associated with the bladder. You notice I am stripping back the peritoneum with a sponge, and pushing off the fat from the outside of the bladder. I have always made a special point of getting the fat well off the bladder, thus preventing necrosis around the bladder afterward. I remember the time when we paid scarcely any attention to this part of the technic, and as a result had a great deal of fat necrosis and many sloughing wounds.

The bladder is now well exposed, and is apparently very thick. I will introduce a couple of guy rope sutures on each side of where I am going to make the incision, so as to hold the bladder in place as we may experience some difficulty in reaching the stone. The patient will not stand very much pressure on the inside of the bladder because of the terrific cystitis which is present. You notice that the catheter which we inserted into the urethra for the purpose of filling the bladder is still in place. We release the end of the catheter and let the fluid run out through the urethra instead of allowing the infected water to run out through the entire wound over the abdomen. You see

as long as I have the peritoneum stripped back and the bladder presenting itself well in the wound there is no danger of injuring the peritoneal cavity I will now make a small incision into the bladder about  $1\frac{1}{2}$  inches long as I believe the stone is fairly good sized I can feel the stone with the end of my finger and would say that it is about  $1\frac{1}{4}$  inches in diameter I am not going to spend much time in trying to remove it with my finger but will apply a stone forceps You notice this forceps is mounted in rubber and will cause little if any damage to the mucosa of the bladder I have a good firm hold of the stone and will deliver it through the opening which I believe is large enough for this purpose It is with some difficulty that I extract the stone through this opening but with a little care it can be done without elongating the incision Every time you elongate an incision the danger of infection is greater and the length of time required for wound healing is prolonged This stone is conically shaped and eroded The conical shaped portion has been fitted into the prostatic urethra and that portion of the bladder has a large ulcer where the stone rested most of the time You can easily understand why it was that this patient took the peculiar position in bed that he did because by standing on his head the stone was thrown into the fundus by the bladder thus relieving him of the pain produced when the stone rested on this very sensitive bladder ulcer I will now put my finger in the bladder to be sure there are no other stones present The bladder is perfectly free from the stone

We will now place a  $\frac{1}{4}$  inch rubber drain in the bladder I usually use a smaller drain in stone cases but this man is suffering from a severe colon bacillus infection in addition to the stone and better drainage is required You who are familiar with infections in the genito-urinary tract know that a colon bacillus infection is very difficult to control and therefore it is very necessary to establish good drainage so that we may give the patient bladder irrigations every day

I have previously said in this clinic that I rarely ever irrigate the bladder after prostatectomy or after scarcely any bladder cases but where this sort of infection exists it is necessary to

establish good drainage in order that we may have perfect irrigation. Some one has just asked what we use for irrigations. A great deal has been written regarding the best irrigating fluid for colon bacillus infection in the bladder. Personally I have had better results from the use of silver nitrate, which I have used in irrigating solution in the strength of 1/5000 down to 1/1000, often using deep injections of 1 to 2 per cent. silver nitrate. Of course the strength of the nitrate solution should be increased gradually. I have even used argyrol, 20 per cent. increasing the strength as the patient was better able to tolerate the pain. At first we irrigate the bladder every day, then every other day, and so on until the infection is practically cleared up. The patient is then cystoscoped, and if the colon infection still persists a ureteral catheterization will be done to ascertain which kidney is producing the infection. If the kidney is producing the infection it would be useless to continue the bladder irrigations, as the kidney is simply emptying the pus into the bladder thus continuing the trouble. In these cases we then introduce a ureteral catheter, through which we inject from 1/2 to 1 1/2 per cent. silver nitrate solution. This is repeated as often as necessary until the infection subsides. The silver nitrate solution not only has an antiseptic effect, but it irrigates the kidney, thus producing thorough drainage.

Some one has just asked me why we did not do a stone-crushing operation in this case. In fact, I think the entire class is wondering why we have not done this kind of an operation. The reason is because of the pathologic condition of the mucosa of the bladder. In the first place, a stone-crushing operation is only possible where you have a clean smooth mucosa. But suppose we did put a lithotrite in this bladder and try to crush the stone and then use a long aspirator afterward. In all probability there would be particles of stone left in the bladder which would adhere to the side of the broken-down mucosa and would only serve as a nucleus for another stone or stones and the patient would be worse off than before the operation. In cases where the mucosa is badly broken down or infection is still present it is not good surgery to try to introduce a lithotrite.

and attempt to crush the stone. In these cases one should always do a suprapubic cystotomy.

You notice now we are closing the wound all the way up to the tube. The tube is at the upper angle of the wound. Each layer has been sutured close to the tube, so when we see this case in a few days there will be primary union in the lower portion of the wound up to the rubber tube. In other words, we have made a water tight wound up to the tube. This is very essential for the patient. He should suffer no more from this operation than from a clean cut appendicitis wound. I have paid a great deal of attention to the closing of bladder incisions, knowing the amount of trouble that can take place afterward and the terrific amount of inconvenience that a patient has who has foul smelling urine running over the abdomen from the continual changing of dressings, and the wet condition of the bed.

It will give me great pleasure to have this entire class inspect this patient at a later date and see the clean wound.

In conclusion I wish to say that removal of the stone alone would not cure this patient. The colon bacillus infection must be treated after operation and I believe it will take some time to clear it up.



## CLINIC OF DR MAURICE A BERNSTEIN

### WESLEY MEMORIAL HOSPITAL

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## THE TREATMENT OF EARLY AND LATE INFECTIONS OF THE HAND AND FINGERS, WITH SPECIAL REFER- ENCE TO TENDON TRANSPLANTATIONS

*Summary* Discussion of infections of the hand and fingers—routes of extension value of early incision and drainage incisions to be employed presentation of 4 cases illustrating the different types of finger infection

CASE I—Acute infection of little finger—improper treatment at onset necessity of wide incision and thorough drainage

CASE II—Acute infection of index finger—infection limited to superficial structures

CASE III—Destruction of tendons as a result of infection of the ring finger—tendon transplantation history technique of operation.

CASE IV—Ankylosis of index finger history technique of operation subsequent course

*September 26, 1918*

INFECTIONS of the hand especially of the fingers, are of common occurrence as the result of industrial accidents

Today I propose to show you a few typical cases of this kind but before doing so I wish to say a few words regarding the nature of the lesions usually met with

Clinically these cases of infection may reach the surgeon either in the early or acute stage, or later when the infection has subsided leaving its effects in the shape of deformity We will first consider the acute infections

An acute infection may be superficial involving the superficial tissues only, or it may be profound involving the tendons and their sheaths Infection involving the superficial subcutaneous tissues can usually be arrested

If a tendon sheath is infected, the patient usually complains of pain along the inner surface of the finger and holds it in a flexed position When the surgeon attempts to extend the finger the patient will cry out with pain This is because of tension

produced upon the inflamed tendon sheath. When an incision is made into the sheath and pus escapes there is no question about its being infected. The limiting membrane which is found in tendon sheaths will not prevent the spread of infection. Fluids injected under moderate pressure will find their way into the deeper structures. Therefore every tendon sheath infection should be opened and drained early.

There are three ways in which an infection of the finger may be propagated. First by way of the lymphatics, second by way of the subcutaneous tissue, third by way of the tendon sheaths. The lymphatic infections are usually of streptococcal origin. They are acute in onset, usually the result of an insignificant pin prick or cut, and are associated with marked constitutional symptoms, fever, and glandular enlargement. Such lymphatic infections when they extend are usually very severe in type, and loss of the patient's life is more to be feared than loss of function or even loss of the member. When a lymphatic infection is suspected the supervision must be extremely careful and surgical treatment when necessary must be radical. I shall not at present refer to these infections.

Of the superficial infections involving the finger the felon which is found on the distal phalanx is the most common. The diagram which I show is from Kanavel's book and it illustrates the pathology very accurately. It can be seen in this diagram (Fig. 464) that the connective-tissue framework of the terminal phalanx is such as to produce a closed sac. The glands lie in the columns of fat and present a portal for the entrance of pathogenic bacteria. The blood vessels run parallel with the phalanx on both sides of the sac. Should pus or edema develop in the closed sac it would have no means of escape and would have a tendency to shut off the blood supply and cause necrosis of the bone. One can often see the bone of the terminal phalanx lying free in this mass of necrosed tissue.

The incision for drainage of a felon must be made to the side of the phalanx and wide enough to permit the escape of pus. By cutting on the side of the phalanx the tactile nerves will not be injured.

We now come to the third avenue of infection—namely, the tendon sheaths—and it is to this class of finger infections and their surgical treatment that I wish to draw particular attention. Before undertaking the treatment of infections of the tendon sheaths one must familiarize himself with the general topography of the hand. Four spaces are to be considered, namely,

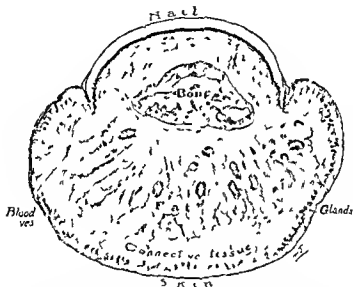


Fig. 464.—Transverse section of the distal phalanx showing the closed pocket with columns of fat radiating from the bone. The glands are well shown and demonstrate how easy it would be for pathogenic organisms to invade this space through these glands (Kanavel).

the radial thenar and midpalmar space and the ulnar bursa because infection of the tendon sheaths will involve one or more of these spaces. The index and little finger differ from the other fingers in that the infection from the index finger may extend to either or all of the following: First the lumbrical space on either side; second the thenar space and dorsum of the hand between the metacarpal bones of the thumb and index



Fig 465 Drawing of the right hand showing two types seen in the literature. Note that on the hand upon the left side there is a bursa between the little finger and the thumb and the ulnar bursa and the tendon sheath of the little finger. In the hand upon the right side the ulnar bursa is separated not only from the tendon sheath of the little finger but also from the tendon sheath of the thumb. The ulnar bursa is shown upon the left side of the picture and the tendon sheath of the little finger is shown upon the right side of the picture.

In the right hand drawing the tendon sheath of the little finger will be continuous along with the ulnar bursa while the left

hand drawing shows the tendon not in communication with this bursa. In this latter case the pus may find its way to the midpalmar space unless it hurrows its way through the obstacle between it and the ulnar bursa. In extensive infections the radial bursa may also be involved. Infections of the little finger therefore usually extend into the ulnar bursa with possible extension to the radial bursa or maybe into the midpalmar space.

Tendon sheath infections from the middle and ring fingers usually involve the midpalmar space only.

Before opening a tendon sheath for the drainage of pus it is necessary to make sure that the infection is not localized to the superficial tissues. By pressing on the base of the finger or palmar surface of the hand it can be determined whether the lumbrical canal or tendon sheath have become involved. This is determined by the egress of pus from those spaces. A probe is introduced along the infected area without trauma and an incision is made upon the probe down to the deep structures.

To drain the thenar space a forceps can be introduced through an incision which is made about  $\frac{1}{2}$  inch below the web to the radial side of the index finger. The forceps is directed inwardly to the third metacarpal bone and then the blades are opened. The pus will find its way to the surface. Considerable care must be exercised in the introduction of the forceps into the thenar space so that injury to the midpalmar space will be avoided. If it is determined that the infection has extended to the dorsum which it usually does a through and through drain should be inserted. An incision on the dorsal surface of the hand must be made between the metacarpal bones of the index finger and thumb and a drain carried through this opening.

For drainage of the midpalmar space an incision is made a little to the side of the ring and middle finger. A probe introduced along the canal will find its way to the midpalmar space and will also drain the lumbrical canal if the infection has extended in that direction.

When the radial bursa is involved the incisions are extensive

They are made on both the radial and ulnar side of the forearm (Fig 466) A forceps should be inserted through one opening and carried beneath all the tendons in the forearm and brought



Fig 466—Lines show areas of possible incisions for infections of the various tendon sheaths. In case of doubt the free incision of the whole sheath is to be advised (Kanavel)

out through the opposite opening A through and through drain is inserted and hot dressings applied The technic which I have followed in the treatment of these acute infections is based on the teachings of Allen B Kanavel One must study a cross-section of the hand in his text to understand the relation of the communicating chambers There is no question that 90 per cent. of the hands could be saved if judgment and care were used in their treatment

We now come to the late effects of finger infections and to the deformities resulting from such infections There are many such chronic cases, and the problem of efficacious surgical treatment constantly arises Where subluxation of the joint with ankylosis has occurred we can promise very little. Many operations have been devised for restoration of the joint but in my opinion once a finger joint *has become ankylosed* there is little hope of getting complete motion The action of the finger is specialized and adapts itself to various degrees of motion In those cases where ankylosis has taken place the synovial membrane becomes thickened, the articular surface becomes rough

ened and the flexor tendons become involved on account of the proximity to the bone What happens therefore is this Dense fibrous adhesions form between the articular surface and the synovial membrane of the tendon sheath resulting in ankylosis

In case of established ankylosis one must plan a two stage operation first to restore the joint and second to establish motion by tendon plastics. Porter maintains that if only one articular surface is removed a false joint can be established and motion in the joint can be restored to a certain degree. The finger however becomes much shortened. The interposition of fascia between the articular surfaces will in a measure prevent the recurrence of the ankylosis and motion must be established as soon as the patient can bear the pain. This procedure will be followed in one of our cases.

Much can be done during the acute stage of the infection to prevent such distorting and destructive processes. Very recent reports of war surgery indicate that ankylosis may be avoided and complete functional movements obtained in infected joint injuries if such are immediately cleansed, sutured and active movements at once instituted. But such treatment has not yet been generally adopted. In our present general practice a finger with an acute infection of the tendon and tendon sheath must be maintained in absolute rest, elevated and kept in an extended position. The finger which is ankylosed in a straight position stands a better chance than one which is ankylosed in flexion because first those fingers have no subluxation of the joint surface, second because there is no flexion contracture of the soft parts. In cases of this sort very satisfactory results can be obtained from tendon transplantations and especially by transplanting the tendon *with its sheath*. The skin conditions must however be corrected before making a transplantation and there must be the further precautions not to transplant a tendon into tissues which are fibrous, thin or avascular. The circulation in the tissues surrounding the transplant must be sufficient to maintain the nutrition of the unimplanted tendon. This operation will be done on some of our cases and its detailed technic explained.

**CASE I—Acute Infection of Little Finger**—This patient is a factory hand. Several days ago he injured the little finger of the left hand. There was a slight bruising of the skin on the flexor surface of the finger close to the proximal crease. On the

third day after the injury the finger became tender and swollen the swelling extending to the ulnar side of the hand. An incision was made by the factory physician into the flexor surface of the finger and another on the extensor side. A through and through drain was inserted and hot applications applied. The



Fig. 46.—Infection of the tendon sheath of the little finger. A white necrosis of the tendon which appeared beneath the rough and beveled edges of the wound everted.

swelling of the hand continued and pus in small quantity appeared on the dressings.

*Examination*—The finger is quite swollen and tender the tenderness extending to the ulnar side of the palm. The edges of the wound are everted and it can be seen that the infection has extended down to and involved the tendon sheath. The

infection has also extended farther down to the midpalmar space and to the extensor surface of the finger (Fig 467)

*Comments*—The case is one of acute extending infection of the tendon sheath of the little finger. The patient shows a swelling below the web of the fingers and tenderness extending to the base of the ring finger. I am inclined to believe that, while the infection has extended down to the sheath on the phalanx, the midpalmar space is not involved, but that the infection has extended to the subcutaneous tissue of the palm and posteriorly to the subaponeurotic space.

I show this case because it is a typical example of the wrong method of treatment. One must never make an incision on the flexor surface of the finger and never over the flexion crease, that is, over the joint. Make the incision laterally. In this case the surgeon should have made a superficial incision into the subcutaneous tissue, because the infection primarily involved the subcutaneous space below the web. Having opened the tendon sheath of the finger, the infection was permitted to extend along that tract, destroying the flexor tendon.

There are some remarks I would like to make in connection with this case. Never stab carelessly into an infected finger with the object of locating pus. Every case of infection of the hand or fingers should be given an anesthetic and a clean-cut incision or, rather, dissection made. Incise the skin and dissect carefully the fascial planes and stop as soon as pus is found. Then enlarge the incision to the desired depth and width. I have seen fingers cut again and again fruitlessly. Why? Because the patient is usually nervous from the throbbing pain and loss of sleep, the surgeon is eager to have the ordeal over with, no anesthetic is given, and as a result a false stab is made, and the patient goes away more nervous and with more pain and without proper drainage. "The blade of the knife is not sensed with vision," said the late Dr J. B. Murphy, "and to thrust a blind knife blindly into a human hand is nothing if not criminal, and therefore, every acute deep infection of the hand should be treated by exploratory dissection under anesthesia.

and anemia." Permanent loss of function is due more to the surgeon's knife than it is to the infection itself.

Every opening must be made large enough. A drain must be inserted and then hot dressings applied. What happens when no drain is inserted and dry dressings applied? The edges of the wound become edematous and exude a serum which coagulates and seals up the opening. That is why hot dressings should be applied. It keeps the coagulum in solution and does not permit sealing. An important point to which I wish to call your attention is the flow of serum from the wound. Wright maintains that as long as serum is permitted to exude from an infected wound the condition is favorable. The serum bathes the wound and brings the lymph to the surface.

When its excretion is interfered with or is permitted to coagulate upon the surface of the wound, the infection takes a centripetal course. That is what is meant by the term "lymph-bound" Moynihan describes it very lucidly, "A mesh of fibrin entangles the blood-cells and a sort of matting of coagulated lymph spreads over all the surface. No fresh serum can then reach the wound, or are fresh leukocytes available for the attack." The infective process can then proceed without the inhibiting effect of the two strongest agencies, namely, the phagocytic action of the leukocytes and the bactericidal action of the serum. When a hypertonic salt solution is applied to an infected surface it stimulates the tissues, and the reaction brings about an increased flow of serum and lymph, together with a fresh supply of leukocytes, the reserve force of defense. The therapeutic value of salt in the treatment of infected wounds has long been recognized, although its use has been abandoned until now, when it has become a popular agency in war surgery.

**CASE II.—Acute Infection of the Index-finger.**—This patient is a laborer, who some six or seven days ago scratched the index-finger of his right hand. The finger became painful and swollen, the swelling limiting itself to the proximal phalanx of the finger. There is some tenderness of the palm present.

*Examination.*—There is some fluctuation at the proximal phalanx of the index-finger, with tenderness and swelling below

the proximal crease. Two incisions were made one to the radial side of the finger and the other on the ulnar side dorsally (Fig 468)

*Comments*—This is a case which illustrates an infection limited to the superficial structures involving the lumbrical spaces. The tendon sheath here is not involved and the infection has not extended to the thenar space. The treatment



Fig. 468—Infection of the index finger with swelling of the proximal phalanx and base of the finger. Incision made laterally below proximal crease.

adopted shows that by opening as we have done the infection has been arrested and confined to the superficial structures. I call your attention to the fact that by pressure at the base of the finger over the lumbrical space pus can be expressed through the incision while pressure over the thenar space will not produce the same effect. This point has already been referred to in the general remarks.

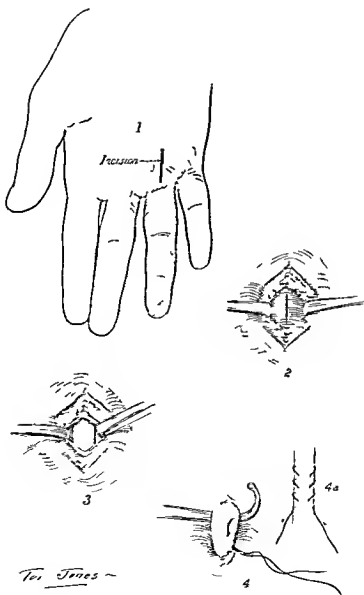


Fig 469

**CASE III —Destruction of Tendons as a Result of an Infection of the Ring-finger—Tendon Transplantation.**—This patient is a brass-worker. About three months ago he cut the ring-finger of his left hand on the flexor surface of the proximal phalanx. On the fourth day the finger became painful and tender, the tenderness extending along the flexor surface of the finger and radiating to the palm. There was an escape of pus from the original opening. The factory doctor opened the wound in a transverse direction and inserted a drain. The opening healed in three weeks, leaving a very small scar, but he was unable from that time on to either extend or flex the finger.

*Examination*—The finger is not ankylosed. There is no atrophy, but a small furrow is found upon the flexor surface of the proximal phalanx. There is some motion at the base of the finger.

*Comments and Operation*—The case is one of loss of function arising from infection of the tendon sheath of the ring finger. The tendons in this man's finger have been either cut or destroyed by the infection. If the tendons were not cut during the accident, they were by the physician who originally handled the case. A transverse incision should never be made through a flexor surface of a phalanx. I do not believe that the ends of the tendons can be approximated, so a tendon transplantation will be attempted.

I am going to transplant a portion of the extensor tendon from his foot to replace the tendon which was destroyed by the infection. This operation was described by Bunnell, of San Francisco, who claims very satisfactory results. I am not going to deviate much from his technic except to introduce a method

---

Fig. 469—A method for direct transplantation of tendons from the foot to the hand. Note in 2 that a tenotome is used to cut the tendon from the foot. In 3 that the foot is held in a position that the force of the contraction of the foot will draw the tendon into the hand. Also that the width of the incision in the hand is made to correspond to the width of the tendon. (4) The tendon is held in place by the upper pole of the needle. (5) The tendon is held in place by the lower pole of the needle. (6) The tendon is held in place by the upper pole of the needle. (7) The tendon is held in place by the lower pole of the needle. (8) The tendon is held in place by the upper pole of the needle. (9) The tendon is held in place by the lower pole of the needle. (10) The tendon is held in place by the upper pole of the needle. (11) The tendon is held in place by the lower pole of the needle. (12) The tendon is held in place by the upper pole of the needle. 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5

*Line of excision*

6



7

*Tom Jones*

Fig. 470—5 The sutures are in place and the tendon is cut across. 6. Incision is made distal to the interphalangeal joint down to the periosteum. The upper portion of the illustration shows the distal portion of the flexor tendon with sutures inserted. 7 Probe is passed beneath the flexor tendons to the tip of the finger. The probe is to be moved from side to side to permit easy entrance of the transplant. The finger is to be hyperextended to make the probe pass more easily

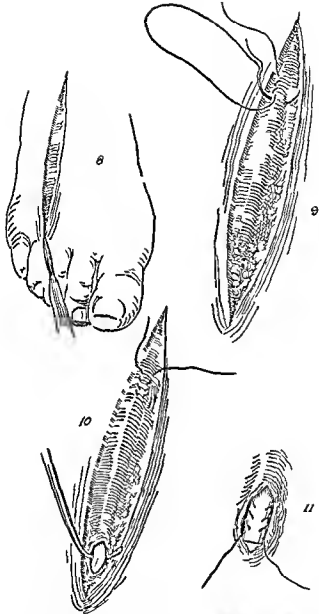


Fig 471—8 Incision made over the tendon of the fourth toe down to the deep fascia. The fourth toe is to be held down with the operator's left thumb so as to put the tendon on tension. 9 The sutures are introduced in the upper pole of the transplant through the surrounding tissue sheath and body of the tendon. 10 The sheath is opened in the lower pole allowing the proper length of tendon for the transplant. The hook is introduced and the tendon brought out into the field. The sutures are inserted as in Fig 469 4c. 11 The sutures in place and



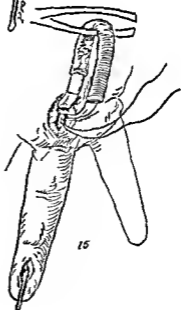
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14



15

*Two Tentacles*

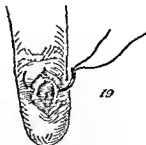
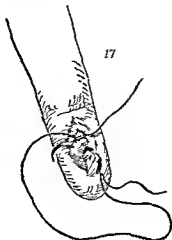
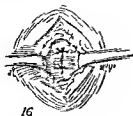
of suture which I believe has not been described before. The difficulty in transplanting tendons which are the size of the tendons of the toes or fingers is in their suture. It is difficult to control such a tendon and Bunnell has devised two very ingenious clamps which hold the tendon ends and facilitate suturing. If the sutures are introduced before the tendon is severed their introduction is greatly facilitated and one does not need these clamps.

We will make the first incision below the proximal crease of the ring finger extending down to the sheath of the flexor tendon for the distance of about  $\frac{1}{2}$  inch (Fig 469 1). We will now make an incision through the sheath exposing the tendons (Fig 469 2 and 3). A curved book is passed beneath the tendons and they are brought out into the wound (Fig 469 4). We will proceed to introduce the sutures by means of a fine French curved needle using very fine silk. Now the sutures are introduced (Fig 469 4a) and we are ready to sever the tendon at the distal portion (Fig 470 5). It must be remembered that the introduction of the sutures must be carried out before the tendon is severed. The tendon is now cut (Fig 470 6) and an incision is made beyond the distal flexion crease to the periosteum of the terminal phalanx. An eye probe is now passed along the flexor surface of the finger and brought out at the distal phalanx (Fig 470 7). The finger must be overextended to permit the passage of the probe.

The foot is now prepared for the transference of the tendon. The fourth toe is held down with the thumb of the operator's left hand and an incision is made through the skin and superficial fascia over the extensor tendon (Fig 471 8). The sutures are inserted (Fig 471 9) through the upper pole of the tendon. This suture is introduced into the peritendinous tissue and

---

Fig 472—12. The tendon is handled by means of the inserted sutures. Incisions are made on either side of the tendon carrying the sheath and peritendinous tissue with it. 13. The transplant is brought out over to the hand and the sutures are tied in square knots and placed between the approximated tendon ends. 14. 15. Probe is threaded and the tendon is drawn down into the canal made by the probe.



*Ten Jones*

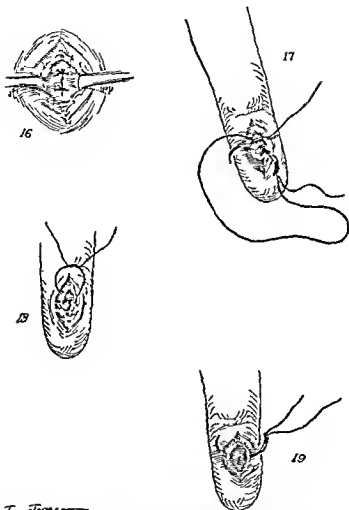
Fig. 473—16 Sheath in the palm is closed with two catgut stitches and the skin with horsehair. 17 One end of suture is threaded and inserted into the deep tissues of the distal phalanx. The other end of the suture is threaded separately. 18 The ends are tied. 19 The deep tissues are closed by one catgut stitch.

tendon. The method of insertion of the sutures is the same as in Fig. 469, 4a. The tendon is measured for the desired length,

and the sheath is opened at the lower pole of the tendon and the tendon brought out by means of a curved hook (Fig 471 10) The sutures are introduced in the exposed tendon as shown in Fig 471 11 The removal of the sheath from this portion of the tendon (Fig 471 11) is done to prevent its interposition when the two ends of the tendon are brought together in the hand The tendon is now severed at the lower pole and the incision carried to either side of the tendon carrying the sheath and surrounding tissue with it (Fig 472, 12) The tendon is handled by means of the retention sutures to avoid unnecessary handling of the tendon proper The sutures of the transplanted tendon are now tied to the distal end of the tendon in the hand (Fig 472 13) and the ends buried (Fig 472 14) The probe is then threaded and the tendon is brought into the canal made by the probe (Fig 472 15) The sheath is closed by two catgut sutures (Fig 473 16) The distal end of the transplanted tendon is then sutured to the deep tissues above the distal crease in the proximal phalanx (Fig 473 17) First one end of the suture is threaded and then the other and it is tied as shown in Fig 473 18 The deep tissues in the distal phalanx are closed with catgut (Fig 473 19) and the skin incisions with horsehair

*Postoperative Comment*—Motion was begun the second day after operation The patient states that he can feel the tendon pulling clear to the tip We will institute daily exercise from now on because upon this early motion we have reason to believe that the efficacy of the functional results will depend

**CASE IV Ankylosis of Index finger**—This patient is twenty seven years of age by occupation an accountant About five years ago he sustained an injury to the palmar surface of his left index finger with a bruising of the skin Two days later the finger became painful and swollen the swelling extending to and involving the palm The second finger also became painful and swollen He had a high temperature and chill and was very sick The swelling and pain continued for about five days when he consulted a physician who opened and drained



*Ten. Tarsus*

Fig 473—16. Sheath in the palm is closed with two catgut stitches and the skin with horsehair. 17 One end of suture is threaded and inserted into the deep tissues of the distal phalanx. The other end of the suture is threaded separately. 18. The ends are tied. 19 The deep tissues are closed by one catgut stitch.

tendon. The method of insertion of the sutures is the same as in Fig 469, 4a. The tendon is measured for the desired length,

from a surgical standpoint. The patient, however, does not want it, and would rather submit to any plastic work which



Fig. 475—1. Lateral view of the bone surface. 2. View of the bone surface by means of the incision. 3. View of the bone surface after removal of the articular surface to the second phalanx.

will offer a chance of probable improvement. We can promise him a straight finger but one that is straight without motion is likewise undesirable because of the danger of fracturing it

both the finger and hand. Pus escaped for six weeks during which time the finger became contracted and has remained so to this day.

*Examination*—The finger is atrophied in the flexor surface so that a groove could be felt along the first and second phalanges. The proximal joint is ankylosed and subluxated so that the finger points in an angular manner into the palm (Fig. 474).



Fig. 474.—Photograph of index finger in Case IV before operation.

*Comments and Operation*—This case like the last is one of deformity resulting from a hand infection. The finger is constantly in his way and is therefore a useless member. What can be done with this finger? Amputation is a deforming operation to him but it would in a way be the most desirable

proximal phalanx, which was adherent to the bone and became thinned out. The operation is worth doing. Perhaps the time will come when we will be able to restore function to all useless members.

*Postoperative Comments*—A slight slough occurred at the point where the skin was thin. Healing was complete in about eleven days. He can move his finger and can do a number of useful things with it (Fig. 476).

If one articular surface is removed and fat and fascia interposed the joint will have some degree of motion.

We make our incision laterally over the proximal joint (Fig 475, 1). Here is the ligament binding the joint. We will retract the extensor tendon which now appears in the incision and insert these bone cutting forceps (Fig 475, 2) and remove the articular surface of the first phalanx. We have removed



FIG. 46—Final result of Case IV three weeks after operation.

enough bone so that the joint is loosened. We will now cut these bands on the flexor surface of the finger which limit the extension. We take care not to injure the skin which is very thin at this point. Now the joint is free and we can extend the finger (Fig 475, 3). We will now perform a similar operation to the one we did in the previous case (Figs 469-473). I fear the motion will not be as great as in the former case because a considerable degree of trauma has been done to the skin at the

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THE  
SURGICAL CLINICS  
OF  
CHICAGO

VOLUME 2, 1918  
*WITH 476 ILLUSTRATIONS*

PHILADELPHIA AND LONDON  
W. B. SAUNDERS COMPANY

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SQUARE, PHILADELPHIA.  
PRINTED IN AMERICA.

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